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ABSTRACT

The traditional K-3 social studies curriculum has focused on food, clothing, shelter, communication, transportation, and other cultural universals. Very little information exists about children's prior knowledge and thinking (including misconceptions) about these topics. A study was designed to provide such information with respect to the topic of shelter. An earlier study described developments across grades K-3 in shelter-related knowledge possessed by students living in a primarily horizontal, low density Michigan suburb. This study compared the interviews from the third graders (n=24) in the previous study with interviews of third graders (n=35) from families living in primarily vertical, high density New York City (Manhattan); 18 were primarily high socioeconomic status students from the Upper West Side, and 17 were primarily low socioeconomic status students from Harlem. Each sample was stratified according to achievement level and gender. Analyses indicated that differences occurred because the Harlem students had less knowledge to bring to bear and therefore were less able to answer the questions (or provided relatively less complete and accurate responses). Otherwise, the response patterns were more similar than different, although each group displayed certain tendencies interpretable as reflective of its geographic location or socioeconomic circumstances. Appended are the shelter interview and relationships of coding categories to school locations data. (Contains 33 references.) (Author/BT)

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IDEAS ABOUT SHELTER EXPRESSED BY THIRD GRADERS FROM VERTICAL/ URBAN VERSUS HORIZONTAL/SUBURBAN COMMUNITIES IN THE UNITED STATES

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Abstract

The traditional K-3 social studies curriculum has focused on food, clothing, shelter, communication, transportation, and other cultural universals. Very little information exists about children's prior knowledge and thinking (including misconceptions) about these topics. This study was designed to provide such information with respect to the topic of shelter. An earlier study described developments across Grades K-3 in shelter-related knowledge possessed by students living in a primarily horizontal, low density Michigan suburb. This study compared the interviews from the 24 third graders in the previous study with interviews of 35 third graders from families living in primarily vertical, high-density New York City (Manhattan), 18 of whom were primarily high socioeconomic status students from the Upper West Side and 17 were primarily low socioeconomic status students from Harlem. Each sample was stratified according to achievement level and gender. Analyses indicated that location differences appeared for 36% of the coding categories. Most of these differences occurred because the Harlem students had less knowledge to bring to bear and therefore were less able to answer the questions (or provided relatively less complete and accurate responses). Otherwise, the response patterns were more similar than different, although each group displayed certain tendencies interpretable as reflective of its geographic location or socioeconomic circumstances.

Anthropologists and other social scientists often refer to cultural universals (sometimes called "social universals" or "basic categories of human social experience") as useful dimensions for understanding a given society or making comparisons across societies (Banks, 1990; Brown, 1991). Cultural universals are domains of human experience that have existed in all cultures, past and present. They include activities related to meeting the basic needs of food, clothing, and shelter, as well as family structures, government, communication, transportation, money or other forms of economic exchange, religion, occupations, recreation, and perhaps others as well. The term implies that activities relating to each cultural universal can be identified in all societies, but not that these activities necessarily have the same form or meaning in each society. On the contrary, it recognizes variations among societies (as well as among individuals within societies) in orientation toward or handling of common life events associated with each cultural universal (e.g., family structures are universal, but different cultures and individuals within cultures have different notions of what constitutes a family).

Cultural universals have special importance for early elementary social studies because much of the basic content taught in the primary grades focuses on them. The traditional reasoning has been that teaching students about how their own and other societies have addressed the human purposes associated with cultural universals is an effective way to establish an initial, predisciplinary knowledge base in social studies, preparing the way for the more discipline-based courses of the middle and upper grades. Two major reasons are cited commonly by supporters of the argument that organizing early social studies around cultural universals provides a sound basis for developing fundamental understandings about the human condition. First, human activities relating to cultural

universals account for a considerable proportion of everyday living and are the focus of much of human social organization and communal activity, so instructional units on cultural universals provide many natural starting points for developing initial social understandings. Until they understand the motivations and cause-and-effect explanations that underlie these activities, children do not understand much of what is happening around them all the time. As they develop such understanding, previously mysterious behavior of their parents and other people significant in their lives becomes comprehensible to them, and they become equipped with intellectual tools that will enable them to begin to develop efficacy in these domains themselves.

Second, children from all social backgrounds begin accumulating direct personal experiences with most cultural universals right from birth, and they can draw on these experiences as they construct understandings of social education concepts and principles in the early grades. If cultural universals are taught with appropriate focus on powerful ideas and their potential life applications, all students should be able to construct basic sets of connected understandings about how our social system works (with respect to each cultural universal), how and why it got to be that way over time, how and why related practices vary across locations and cultures, and what all of this might mean for personal, social, and civic decision making.

Not everyone agrees with this rationale, or even with the notion of social studies as a pre- or pandisciplinary school subject organized primarily as preparation for citizenship. Some people advocate basing school curricula directly on the academic disciplines. They would offer separate courses in history, geography, and the social sciences, simplified as needed but designed primarily to pursue disciplinary goals rather than citizenship education

goals. With particular reference to the primary grades, Egan (1988), Ravitch (1987) and others have advocated replacing topical teaching about cultural universals with a heavy focus on chronological history and related children's literature (not only historical fiction but myths and folk tales). We agree that K-3 students can and should learn certain aspects of history, but we also believe that these students need a balanced and integrated social education curriculum that includes sufficient attention to powerful ideas drawn from geography and the various social sciences, subsumed within citizenship education purposes and goals. Furthermore, we see little social education value in replacing reality-based social studies with myths and folklore likely to create misconceptions, especially during the primary years when children are struggling to determine what is real (vs. false/fictional) and enduring (vs. transitory/accidental) in their physical and social worlds.

Some of those who are opposed to a focus on cultural universals in early social studies have asserted, without presenting evidence, that there is no need to teach this content. Ravitch (1987) dismissed it as "tot sociology," arguing that it holds little interest or value for students, partly because they already know it from everyday experience. Larkins, Hawkins, and Gilmore (1987) also suggested that primary students already know most of this content, so there is no need to teach it in school. The authors of this report have disputed these arguments, suggesting that the knowledge about cultural universals that children develop through everyday experience tends to be tacit rather than well-articulated. Furthermore, much of it is confined to knowledge about how things are without accompanying understandings about how and why they got to be that way, how and why they vary across cultures, or the mechanisms through which they accomplish human purposes (Brophy & Alleman, 1996).

Recent developments in research on teaching suggest the need for data that speak to this issue. Increasingly, theory and research have been emphasizing the importance of teaching school subjects for understanding, appreciation, and life application, using methods that connect with students' prior experience and engage them in actively constructing new knowledge and correcting existing misconceptions. In mathematics and science, rich literatures have developed describing what children typically know (or think they know) about the content taught at their grade levels. This information informs the design of curriculum and instruction that both builds on students' existing valid knowledge and addresses their misconceptions.

There is potential for applying similar methods in social studies if more is learned about children's ideas about topics commonly taught at school. So far, little such information exists about topics addressed in K-3 social studies. Child development researchers have concentrated on cognitive structures and strategies that children acquire through general life experiences rather than on their developing understanding of knowledge domains learned primarily at school. Research in the Piagetian tradition has focused on mathematical and scientific knowledge, although there have been some studies of stages in the development of economic, political, and social knowledge (Berti & Bombi, 1988; Furnham & Stacey, 1991; Furth, 1980; Moore, Lare, & Wagner, 1985).

Scholars concerned with curriculum and instruction have not developed much of this kind of information either. There have been occasional surveys of knowledge about particular social studies topics (Guzzetta, 1969; Ravitch & Finn, 1987; U.S. Office of Education, 1995a, b). However, these have concentrated mostly on isolated facts such as names, places, or definitions, with reporting of findings limited to percentages of students

able to answer each item correctly. To be more useful to educators, the research needs to emphasize questions that probe children's understanding of connected networks of knowledge and analyses that focus on qualitative aspects of their thinking about the topic, including identification of commonly held misconceptions.

Significant progress has been made in studying children's developing knowledge of politics and government. For example, children are much more aware of the administrative than the legislative or judicial aspects of government and they tend to view presidents as godlike figures notable for their power to get things done and their benevolence or caring about the needs of each individual citizen (Connell, 1971; Greenstein, 1969; Hess & Torney, 1967; Moore, Lare, & Wagner, 1985; Stevens, 1982). Research on economics knowledge has begun to uncover stages in children's development of understanding of, as well as common misconceptions in their ideas about, such topics as the functions of banks and the operations of retail stores (Berti & Bombi, 1988; Berti & Monaci, 1998; Byrnes, 1996; Jahoda, 1984; Schug, 1991).

Several teams of investigators have studied children's historical learning (Barton & Levstik, 1996; Brophy & VanSledright, 1997; McKeown & Beck, 1994). This work has demonstrated, for example, that much of the historical knowledge of fifth graders is organized in narrative form, so that it tends to feature stories focused around a few hero figures rather than less personalized causal analyses of historical trends. The students' narratives also tend to compress time and space by depicting face-to-face interactions between people whose life spans did not overlap (e.g., Columbus and the Pilgrims).

Very little information is available concerning children's knowledge and misconceptions relating to the cultural universals emphasized in K-3 social studies

curricula. As a first step toward developing such information, we interviewed middle-class students late in the spring of second grade on various aspects of the topic of shelter (before and after they experienced an instructional unit on the topic). Shelter is not only a cultural universal but a basic need, and all of the students had had experience with it throughout their lives. Thus, if Ravitch and others had been correct in their assertion that children develop clear knowledge about such topics through everyday experience, we should have seen such knowledge demonstrated by middle-class children who were nearing the upper end of the primary-grade range. Instead, we found that the students' prior knowledge about topics relating to shelter was limited and spotty, tacit rather than well-articulated, comprised of loose collections of observations rather than well-integrated knowledge networks that included awareness of connections and understanding of cause-effect relationships, and often distorted by inaccurate assumptions or outright misconceptions (Brophy & Alleman, 1997).

These findings motivated us to launch a series of studies on developments across Grades K-3 in students' knowledge and thinking about cultural universals. Our intention is to generate findings that will have immediate value to social educators interested in developing more powerful curriculum and instruction for the early grades and teaching in ways that connect with students' prior knowledge. We also expect the findings to be of interest to scholars who study developments in children's general cognition or domain-specific knowledge.

All of these studies involve interviewing large samples of students stratified according to grade level (K-3), prior achievement level (high, average, low), and gender (boys, girls). In addition, the first two studies (on shelter and clothing) involved stratifying

students according to the socioeconomic status (SES) of the populations served by their respective schools (upper middle-class suburban, middle-class suburban, lower middle-class urban). Interview protocols feature questions designed to elicit extended statements of students' thinking about the topic. Responses are coded for the presence of commonly mentioned ideas or response elements, and scores derived from these codes are subjected to quantitative statistical analyses. In addition, unusual responses or elaborations of common responses that go beyond the basic ideas represented by the coding categories are listed and discussed in the reports. Analyses focus on general levels of knowledge and trends observed across grade levels, but with attention to how these trends interact with prior achievement level and gender. Findings are discussed with emphasis on their potential implications for curriculum and instruction in primary-grade social studies and on what they suggest about more general developments in children's social knowledge and thinking.

Our Initial Study of Children's Knowledge and Thinking About Shelter

Not much research is available on children's thinking about shelter except for that generated in our own interview study. The complete technical report for that study is available in the ERIC archive (Brophy & Alleman, 1999), and articles reporting parts of the findings have been published in several journals (Brophy & Alleman, 2000, 2001, in press a, in press b).

Interview Development

For our main shelter study, we developed an interview protocol designed to elicit students' thinking about what we consider to be key ideas that ought to be emphasized in an elementary social studies curriculum that treats shelter as a cultural universal. The content base for the interview was synthesized from three general sources: (1) social studies education textbooks and other sources that identified key ideas about shelter that are rooted in the social science disciplines; (2) information about shelter typically included in elementary social studies textbook series or in children's tradebooks on the topic; and (3) our own ideas about the key features of elementary social studies units that focus on cultural universals and are designed to teach the material for understanding, appreciation, and life application (Brophy & Alleman, 1996). Concerning shelter, we believe that basic instruction should help students to understand and appreciate the reasons why different forms of shelter have been constructed in the past and present. Students can learn that people's shelter needs are determined in large part by local climate and geographical features and that most housing is constructed using materials adapted from natural resources that are plentiful in the local area. Other key ideas to which they might be exposed include: (1) certain forms of housing reflect cultural, economic, or geographic conditions (tipis and tents as easily movable shelters used by nomadic societies, stilt houses as adaptation to periodic flooding, highrises as adaptation to land scarcity in urban areas); (2) inventions, discoveries, and improvements in construction knowledge and materials have enabled many modern people to live in housing that offers better durability, weatherproofing, insulation, and temperature control, with fewer requirements for maintenance and labor, than anything that was available to even the richest of their

ancestors; (3) modern industries and transportation make it possible to construct almost any kind of shelter almost anywhere on earth, so it is now possible for those who can afford it to live comfortably in very hot or very cold climates; and (4) forms of shelter that existed in the past and that still exist in some societies today are much simpler than the modern homes that most American students live in, but they typically represent intelligent use of locally available materials to construct homes that not only meet basic shelter needs but are well adapted to the local climate and reflective of the cultural mores of the inhabitants.

After identifying and sequencing the content base to be addressed in the interview, we developed and revised initial drafts of the interview protocol. These drafts featured primarily open-ended questions, typically followed by planned probes, designed to elicit extended statements of students' knowledge and thinking about the topic. Probes were designed to reveal whether students understood and could explain the concepts or relationships addressed by the initial questions (and if not, what alternative concepts or relationships they might have constructed). Most questions were purely verbal, but a few were accompanied by photos or drawings (where we suspected that some students might not be familiar with a key term used in the question).

The "funnel" interview technique was used, in which initial broad questions encourage students to make extended statements about a topic, attending to whatever aspects of the topic they select for focus on their own initiative, and explaining themselves in their own words. Probing then begins with follow-up questions asking (if necessary) for clarification or elaboration of what students have said in their initial statements. Finally, more specific questions are asked (if necessary) to call students' attention to aspects of the topic that they did not address spontaneously. This approach maximizes the degree to

which students' responses reflect their own unique stances toward and construction of knowledge about the topic, and it minimizes the cueing of specific responses through suggestive questions. Yet, it also ensures that all of the students address certain key aspects of the topic (either because they do so spontaneously in responding to initial broad questions or because they are asked more specific questions later).

Successive drafts of the interview were piloted with students who were not involved in the later study. This pilot work led to revisions designed to make sure that all questions were clear, to specify probing and follow-up questions more completely, and to eliminate questions that were too easy or difficult to be useful. This process eventually yielded the final version of the interview shown in Appendix 1.

Sample

For the main study, shelter interviews were conducted with a large sample of 216 students, 54 in each of Grades K-3. In addition to grade level, the sample was stratified by SES of the community, students' prior achievement levels, and students' gender.

Socioeconomic status variation was introduced by conducting one third (72) of the interviews in each of three communities. The first was an upper-middle class suburban community. Its students score very high on state assessments and other indicators of educational achievement. Almost all of them complete high school and most go on to college. The second community is a middle/working class suburb. Its students also score well on achievement indicators and heavy majorities of them graduate from high school, but only about half of these graduates go on to college. The third community is a small city (population about 160,000). Its students do not perform as well as the students in the two

suburbs on state assessments and other achievement indicators, and they show notably lower rates of high school graduation and college attendance. However, these rates vary considerably by neighborhood. The schools in which we interviewed students would be considered average or slightly above average for the city as a whole. Most of their students came from lower-middle/working class families.

Reflecting their school populations, the majority of the students we interviewed were white. We did not consider race or ethnicity in identifying students for the sample, except for the stipulation that all interviewees must have spent all or at least most of their childhood in the United States. Recent immigrants or students who had spent most of their preschool years in other countries were not included, because an assumption underlying the work was that what the students knew about shelter (other than what they had been taught at school) had been learned in the process of growing from infancy in the contemporary United States (particularly through home and neighborhood experiences and exposure to television and other media).

Interviewees were selected from among students whose parents gave us permission to do so. Most parents who returned our forms did give such permission, although a significant minority of parents never returned the forms despite repeated requests. Once the potential interviewees in a given classroom were identified, they were listed alphabetically by gender and the teacher was asked to characterize them, within gender groups, as being within the upper third, the middle third, or the lower third in general academic achievement.

Collection and Preparation of Data

Students were interviewed individually. The interviews typically lasted about 30 minutes and were conducted in small offices or other locations within their schools but outside of their classrooms. To facilitate rapport with students and make sure that their responses were preserved verbatim, the interviews were tape recorded, using a microphone that could be placed unobtrusively on the table and did not require either the interviewer or the student to handle it or speak directly into it. Interviewers were instructed to establish good rapport with the student before beginning and then to conduct the interview in a relaxed and conversational style rather than a more formal or test-like style.

The tape recorded interviews were transcribed by one person and then listened to by a second person who identified omissions and inaccuracies in the transcripts. Data for statistical analyses were then developed by coding the corrected transcripts.

Coding the Transcripts

We did not attempt to force students' responses into predetermined coding categories. Instead, we allowed the categories to arise from the data, using what have been called analytic induction methods for developing grounded theory (Bogdan & Biklen, 1982; Glaser & Strauss, 1979; Patton, 1990). Coding schemes were developed by reading responses to each question and identifying common ideas (embodied in similar statements) that represented alternative ways to respond to the question. Responses then were coded for the presence or absence of mention of these common ideas. Multiple codes were assigned if the student mentioned more than one of the ideas. In addition to categories

encompassing common ideas, each coding scheme contained an "other" category for flagging rare or unique responses.

After initial versions of the coding schemes were developed and refined, reliability was established between two coders who coded one-fourth of the transcripts (stratified according to grade level, achievement level, and gender). Upon completion of this coding, the two sets of codes were compared and inter-coder agreement percentages were computed. Most coding schemes initially met our criterion of 60% exact agreement across coders. When coding schemes failed to meet the inter-coder agreement criterion, the coders analyzed the problem and made adjustments in the coding schemes, then coded the one-fourth sample of responses again. All of the revised coding schemes met the inter-coder agreement criterion at this point. Across the 39 coding schemes used, exact agreement percentages ranged from 60% to 100%, averaging 79%.

Once the coding schemes had met the reliability criterion and been revised as needed (to incorporate minor alterations or elaborations suggested by insights developed while coding to establish reliability), the two coders used them to code all of the interviews. Upon completion of their independent coding, they compared their codes and negotiated agreement on all discrepancies. They also developed a running list of the rare and unique responses that had been coded into the "other" categories, as well as any unusual elaborations of common ideas that seemed worth preserving for possible inclusion in the report. Thus, the report encompasses not only the commonly observed response variations that were amenable to statistical analysis, but also the rare or unique responses and any elaborations on common responses that seemed worth including because they appeared to have theoretical or practical significance (Brophy & Alleman, 1999).

Once coding was completed, the codes were converted into scores that became the bases for statistical analyses. In most cases the codes were used as is. However, some commonly occurring responses that originally were coded in the "other" category were broken out to create new scores, and some categories that were coded too infrequently to serve as a basis for useful statistical analyses were folded into related categories or simply omitted from such analyses.

For example, only nine students' explanations for why some Indians lived in tipis were coded for "portability without explanation" and only nine others were coded for "portability with explanation." In addition to using these two codes as separate variables that retained the "explained" vs. "could not explain" distinction, we combined them to create a new score, "mentions portability (explained or unexplained)" that was coded as present for all 18 of these students but absent for the remaining 198 students who never mentioned portability at all.

Other combination scores sometimes were created even when low frequencies of their component codes were not an issue, simply because the combination scores also were meaningful and allowed analysis of higher-order questions about the topic that could not be addressed directly using the individual component scores. Finally, if the "other" category included one or more ideas mentioned frequently enough to be worth analyzing in its own right, codes representing these ideas were removed from the "other" category and placed into a category of their own, and scores were derived accordingly. Such scores can be seen in Columns 44-47 in the example below, which shows the full set of scores derived from the coding of students' explanations for why some Indians lived in tipis rather than some other kind of home:

Columns 37-49: Scores derived from coding of reasons given for living in tipis.

Column	Why Indians lived in tipis
37	Doesn't know/no relevant response (0=no, 1=yes)
38	Unspecified preferences (0 = no, 1 = yes)
39	Single/small family home; privacy (0 = no, 1 = yes)
40	Lack of construction materials or knowledge (0 = no, 1 = yes)
41	Poverty or low status (0 = no, 1 = yes)
42	Portability (unexplained) (0 = no, 1 = yes)
43	Portability (explained) (0 = no, 1 = yes)
44	Quick/easy to build (0 = no, 1 = yes)
45	Protection from enemies (0 = no, 1 = yes)
46	Fire for warmth or cooking (0 = no, 1 = yes)
47	Paint, decorate them (0 = no, 1 = yes)
48	Other relevant response (0 = no, 1 = yes)
49	Mentions portability (explained or unexplained) (0 = no, 1 = yes)

Data Analysis, Interpretation, and Presentation

Scores derived from the codes were subjected to statistical analyses designed to reveal trends in the sample as a whole as well as contrasts across subgroups of students who differed in grade level, SES, achievement level, or gender. These analyses included frequency distributions and means reflecting the degree to which various ideas were expressed across the sample as a whole and within its stratified subgroups, correlation

coefficients indicating the direction and degree of relationship among the variables, and Chi-Square analyses indicating when subgroup differences were large enough to reach statistical significance.

Initial inspection of the results of these analyses indicated that (1) the response patterns to most questions featured statistically significant and often quite dramatic grade level differences showing increases in level and accuracy of knowledge across the K-3 range, (2) the SES differences, the achievement level differences, and (especially) the gender differences were much smaller and less likely to reach statistical significance, and (3) most of the SES and achievement level differences that did appear were in the expected direction and thus not especially interesting or informative (that is, students who were higher in SES or prior achievement level tended to have more, or more accurate, knowledge than students who were lower in SES background or prior achievement level, but the same general developmental patterns were observed in each group).

Summary of Findings From the Initial Study

The students' responses emphasized description over explanation and form over function. The students recognized differences in the size, construction material, durability, and general quality of the shelter provided by different forms of past and present housing, but they did not understand much about the historical, geographical, or cultural reasons for these contrasting housing styles. For example, they did not know much about why particular forms were emphasized by particular Native American tribal groups. Most were not aware that certain tribes were nomadic societies that moved with the buffalo, so they did not appreciate that portability was a crucial quality of tipis. They were unable to

explain why certain tribes used tipis, or else suggested reasons such as that tipi dwellers were poor people who could not afford better homes, preferred a tipi because they could build a fire in it and the smoke would discharge through the hole in the top, or needed something to do with leftover animal skins that they didn't want to waste. Most were able to make sensible statements about differences between pueblos and longhouses (e.g., in size or construction materials), but few mentioned differences in climate and geography as factors contributing to the differences between these two forms of Native American housing.

Responses concerning log cabins and pioneer life were more accurate and less fanciful than responses concerning Native American homes and cultures. Even so, misconceptions were common (e.g., that the cabins could collapse easily because the logs weren't nailed together). Furthermore, most of the students emphasized the deficiencies of these homes in comparison with contemporary housing rather than appreciating them as inventive adaptations to their time and place (i.e., they displayed historical presentism).

In thinking about contemporary housing, they focused on what is visible inside and outside the home but did not show much awareness of what is in between the walls or beneath the building. They knew that shelter is a basic and universal human need, but they were less appreciative of modern homes as controlled environments for comfortable living that cater to a great many of our wants as well as our more basic needs.

Most students understood that people have to pay for shelter and that most people prefer houses to apartments. However, they had difficulty explaining what is involved in renting apartments and why some people choose to do so. Only a few understood that renting is a profit-making business or that people can get mortgage loans to allow them to

move into a home before they have accumulated its full purchase price. No student indicated knowledge of the build-up of equity, the appreciation of property value, or other concepts relating to investment or economic assets.

There was only limited awareness of the mechanisms through which modern houses are supplied with water, heat, light, and other conveniences. Almost all students understood that water is piped into the home, but many were vague or incorrect about the sources of this water, did not appreciate that the water is drawn from fresh- rather than salt-water sources and purified before being sent to homes, and did not realize that it arrives at homes under pressure. Most understood that thermostats are used to adjust heating, but were vague about where the heat comes from or how the system works. Students' thinking appeared to progress from believing that a utility company supplies heat directly and the furnace is merely a storage place, to knowing that heat is generated in the furnace but not knowing how, to know that the furnace contains a fire that heats air (only 13 percent clearly understood that furnaces contain a fire). A majority of the students knew that electricity is involved in creating light, because they knew that one must throw a switch to allow electricity to enter the bulb. However, they were unable to explain how the arrival of electricity causes the bulb to light up.

Most students understood that families pay for water that is piped into their homes, according to how much they use. However, most were unclear or incorrect about payment for heat and light. Few understood that "heat" bills are actually for natural gas consumed in fires that create heat in furnaces or that "light" bills are actually for electricity consumed when light bulbs are activated.

When asked about their ideal future homes, most students depicted single-family homes located in suburban or semi-rural areas, near relatives and friends but removed from urban density and crime. Their responses emphasized many of the same home features and location considerations that their parents might have mentioned in response to the same questions, except that only small minorities of the students talked about locating near the children's schools or the parents' work places.

Grade Level, SES Level, Achievement Level, and Gender Differences

More than half of the coding categories showed statistically significant, linear relationships with grade level. These can be summarized simply by stating that the younger students were more likely to be unable to respond or to be coded in categories reflecting low-level responses, whereas the older students were more likely to be coded in categories reflecting sophisticated responses. Overall, then, the data showed consistent tendencies for increases in knowledge across the K-3 grade level range.

The progressions across SES and achievement level groups were similar in pattern to the grade-level progressions but usually much smaller and not statistically significant. Given the observed ranges for the variables analyzed statistically, the patterns for the three SES groups were much more similar than different. This suggested that the students' knowledge about the topics addressed in our questions was shaped more by their common learning at school and exposure to contemporary U.S. media and culture than by contrasting socioeconomic aspects of their home backgrounds. There was no evidence of strikingly contrasting patterns of knowledge within contrasting SES subgroups, although a few differences may have reflected home background experiences related to social class

rather than differences in amounts of general information held as prior knowledge. Higher SES students were more likely than lower SES students to suggest that Native American longhouses were for poor people, to say that modern houses contain desirable extras that apartments do not offer, to say that buying is preferable to renting because it allows you to own your own place, and to say that their ideal homes would be large and located away from urban traffic and noise (whereas lower SES students were more likely to say that their ideal homes would be located near to food stores and restaurants). To explore these possibilities further, we introduced more extreme SES variance in recruiting samples for our follow-up study.

The achievement level differences confirmed expectations that higher achievers would show more complete or accurate knowledge about shelter than lower achievers. In particular, differences in academic skills may have influenced students' responses to items that involved showing photos or drawings. The higher achievers appeared to be more adept than the lower achievers at studying these illustrations to identify cues suggesting potential responses.

Gender differences were observed for only 9% of the categories, but these fell into patterns that make sense given what is known about gender differences in socialization. Boys had more to say than girls about why different Native American tribes built pueblos, longhouses or tipis; about what happens to water before it reaches our homes; and about furnaces, forced-air heating, and electric lighting. Also, boys were more likely to say that apartment dwellers live in apartments because they cannot afford houses, whereas girls were more likely to say that they do so because they only need small living quarters. Girls were more likely than boys to note that log cabins had dirt floors and lacked color, paint, or

wallpaper on the walls, as well as to specify the colors of their ideal home and talk about how it would be located near food stores or restaurants and the children's schools. In summary, boys were more interested in the economics and construction aspects of shelter, whereas girls were more interested in the décor and family-living aspects.

Rationale for Follow-Up Study

The students interviewed in our initial study all lived in residential areas of a Michigan city or in some of its suburbs. The majority lived in single-family homes, with the rest living in trailer parks, duplexes, or apartments in small apartment buildings. In short, the students lived in low-rise buildings in relatively low-density neighborhoods.

Given these geographical limitations to the sample, it seemed possible that somewhat different patterns of response to at least some of our questions might be elicited from students living in other types of communities. To address this possibility, we initiated follow-up research that involved interviewing third graders who lived in Manhattan, a highrise, high-density urban location that contrasts sharply with our Michigan students' lowrise, low-density location. The Manhattan students lived in apartments or condos rather than single-family homes. There were other differences as well, including the fact that most of the Michigan students' homes featured furnaces and forced-air heating systems, whereas many of the Manhattan homes featured boilers and steam radiator systems.

The Manhattan sample was composed of two subsamples that contrasted sharply with each other and also with the Michigan sample on socioeconomic indicators. One of these subsamples was predominately white and from upper-middle or upper-class backgrounds, whereas the other was predominately African-American and from lower

working or lower class backgrounds. The former students attended a school in the upper west side of Manhattan, and the latter students attended a school in Harlem.

For this study, the responses of these third graders interviewed in New York City were compared with those of the third grade Michigan students interviewed in our initial study. The Michigan sample included 54 third graders, fully stratified according to SES (three levels), achievement (three levels), and gender (boys, girls). Resource limitations precluded our recruiting similarly large and fully stratified samples in Manhattan. The West Side sample consisted of 18 students (8 boys and 10 girls; 9 high achievers, 6 average achievers, and 3 low achievers). The Harlem sample consisted of 17 students (10 boys and 7 girls; 6 high achievers, 5 average achievers, and 6 lower achievers). Given these numbers, the achievement level and gender comparisons primarily reflect trends observed in the Michigan sample that comprised 60% of the third graders interviewed. Consequently, the main comparisons of interest are those for the three geographical locations. Those findings are presented below, organized according to the same clusters of questions that were used to organize our report of findings from the initial study (Brophy & Alleman, 1999). Findings from the achievement-level and gender comparisons are summarized later in the report.

Why People Need Homes

The first two questions assessed students' understanding that shelter is a universal human need:

Question 1. Do people live in homes just because they want to, or do they need homes?

Question 2. What about in places like Hawaii where it's warm all year round? Do people still need homes there?

The second question was included because we assumed that students living in Michigan (and presumably in New York as well) would tend to answer the first question by saying that people need homes as shelter from cold or winter weather.

Descriptive statistics and information from the Chi-square analysis of scores derived from the coding of Questions 1 and 2 (and all of the other questions in the interview) are given in Table 1. The numbers in the left side of the table in the columns for the total sample (N = 89) and the three location groups (Ns = 18, 17, and 54) are simple frequency scores indicating the numbers of students in the sample as a whole and within each location group who were coded for mentioning the idea represented by the response category. The numbers in the right side of the table are percentages corresponding to the raw scores on the left side. Sets of scores are underlined if the analyses described below identified statistically significant relationships between the frequency of use of a response category and the students' locations.

The score distributions were subjected to Chi-square analyses to determine the probability of obtaining the observed group totals if it is assumed that the variable appears with the same frequency in each group within the population as a whole (in other words, if it is assumed that there are no group differences). A statistically significant result indicates that the variance in the group totals exceeds that which might be expected to occur because of chance variations in sample characteristics.

When the Chi-square test indicated statistically significant variance in the location group scores, the group totals were underlined and information about the probability level

of the obtained Chi-square statistic was entered in a probability column. Sets of scores have been underlined and probability data have been included in the table whenever the probabilities involved were .10 or below (two-tailed test).

Responses to the first question indicated that all of these third graders knew that people need homes, but the groups differed somewhat in the rationales that they generated to explain shelter needs. Students were coded for protection rationales if they said that people need homes for protection against the elements or against attacks by insects, animals, or other people. They were coded for homebase rationales if they said that people need homes to provide a base for everyday living (eating, sleeping, etc.) or a place to keep their belongings. Compared to the Michigan and West Side students, the Harlem students were more likely to confine their explanations to homebase rationales rather than to mention protection rationales or both types of rationales. Our initial study established that younger students (within the K-3 grade range) were more likely to mention only homebase rationales, whereas older students were more likely to mention protection rationales or (especially) to suggest both types of rationales. This was the first of many comparisons in these data indicating that the Harlem students displayed less knowledge or generated less mature forms of response than the students in the other two groups. In this case, however, it is worth noting that we are unable to explain why protection rationales are relatively more mature than homebase rationales. Both of these rationales are fundamental and they appear to be of equal importance as explanations for why people need homes.

When asked whether people need homes in Hawaii, 94% of the students still said yes, but a few said no or gave mixed responses (e.g., a home wouldn't be absolutely necessary in that climate but most people would want to live in one). Once again, the

Harlem students were more likely to mention only homebase rationales, whereas the other students were more likely to mention protection rationales or both kinds of rationales. In particular, the West Side and Michigan students were more likely to mention the need for homes to provide protection against rain, against sun or heat, or against the fury of nature (hurricanes, tornados, etc.). They also were more likely than the Harlem students to say that people need homes as a place to store all of their possessions, even though they were less likely to mention homebase rationales overall. Once again, these differences between the Harlem students and the other students reflected the differences between the younger students and the older students observed in our initial study.

Rare and Unique Responses

The following responses to the first two questions involve interesting elaborations on the ideas represented by the coding categories or embody ideas that are not included in those categories. Here and throughout the rest of the report, most of these responses are paraphrased to save space and focus on their key ideas, although occasionally we quote verbatim when it appeared worth doing so.

West Side: So nobody can sneak in and no crabs or snakes can bite them; to keep you safe from animals that eat people, and if someone doesn't want to get a tan, they could stay in the house and watch TV; if they don't have houses, they don't have jobs or money for food; you want a place for privacy—a habitat that you design the way you want it to be, and in Hawaii you would want a pretty grass or bamboo house; in Hawaii you would want a glass house so you could see the ocean; you want a place for privacy.

Harlem: It's dirty in the streets (but clean inside homes); homes are natural environments for people (as opposed to animals); if you sleep on the beach, lobsters could bite you, also you need a home so you can have money; so your stuff doesn't get stolen; so they don't get germs; the water might flood you if you slept on the beach.

Michigan: At home you can play hide and seek with your brother; you need a fence around the house so that you can have dogs; there are bad things in the world and something might happen to you outside; you need an address to get a job or money (2); if something bad happens you can just go inside; a home protects you from danger on the streets at night; to protect you from germs; a place to keep pets (3); you might get a disease or something if you had to live outside; and people need homes so other people can't steal from them or abduct them.

Discussion

The overwhelming majority of these third graders understood that shelter is a basic human need, even in places with climates like Hawaii's. Most (84%) mentioned one or more rationales in addition to or instead of protection from cold or winter weather even in response to the first question, and most of those who only mentioned protection from winter weather in responding to the first question were able to cite other rationales when asked about the need for shelter in Hawaii. The major group difference observed was that the Harlem students were more likely to confine their responses to statements that people need homes as a base for eating, sleeping, watching television, and other daily activities, whereas the West Side and Michigan students were more likely to say that people need homes for protection from rain, sun, heat, tornados, or other natural elements, as well as to

speak of homes as places to store possessions. The Harlem students' response pattern was similar to the one observed for younger students in our initial study, whereas the pattern for the West Side and Michigan students was reflective of the pattern observed in older students.

Pueblos and Longhouses

Question 3 was designed to determine whether students understood that in the past, people not only had to build to suit their climate but had to do so using whatever potential construction materials were readily available in the local area. The students were shown a drawing of a longhouse and a photo of a pueblo and asked to talk about why these two types of Indian homes were so different (we use the term "Indians" here because pilot testing had established that this term was familiar to the students, whereas the term "Native Americans" usually was not). Probing was designed to see if the students understood that these contrasting housing types reflected the fact that pueblo dwellers lived in a hot, dry climate that did not support much vegetation but longhouse dwellers lived in a four-seasons climate that supported thick woodlands.

Question 3. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home but others lived in this kind of home? . . . The Indians who built these homes (pointing to the pueblo)—could they have built these homes instead (pointing to the longhouse)?

The students provided a variety of explanations for the different types of homes, but only 20% of them focused on differences in local availability of construction materials.

The rest showed little or no awareness of the fact that until relatively recently in human history, most people's options in housing construction materials were limited to what was available in the local environment.

Most students merely described rather than explained the differences in housing styles. They usually did not know the names "pueblo" or "longhouse," but by pointing to the illustrations they could talk about pueblos as sturdy constructions made from sand, stone, cement, or bricks, and longhouses as flimsier constructions made from trees, branches, and leaves.

The most common response was based on the idea that one form of housing was larger than the other. Most of these responses indicated that the inside living space in a longhouse was larger than the inside living space in a pueblo apartment and thus enabled extended families to live together. However, some students noted that the pueblo buildings (as opposed to the individual apartments within them) were much larger as well as more durable than longhouses. Some of them went on to suggest that this enabled pueblos to provide better protection against enemies or severe weather events.

The Chi-square analyses indicated significant group variance on several of the categories, although this did not include the category for responses pointing to the local availability of construction materials. Two trends are noteworthy in the group differences. First, the West Side and Michigan students were more likely than the Harlem students to provide substantive responses to Question 3, and in particular, to provide "other" responses that did not fit into the coding categories. Second, the Michigan students were more likely than students in the New York groups to provide descriptive responses indicating that

pueblos are more durable or that one of the types of housing was bigger or fit more people than the other.

When probed about whether pueblo dwellers could have built longhouses instead, most of the students said yes, were unsure, or said no but could not provide an explanation. Only about a fourth of the students were able to provide the explanation that the pueblo dwellers would not have had access to sufficient wood, for lack of abundant forests. Half of the West Side students but only about 20% of the Harlem and the Michigan students were able to provide this explanation.

Rare and Unique Responses

West Side: Six West Side students said that richer people built pueblos but poorer people built longhouses, and three of these students mentioned the word "architecture" in answering this question. Other rare and unique responses: Longhouses were for people who couldn't afford a personal house; pueblos were for people who wanted to live in a village.

Harlem: They couldn't afford houses, so they just used straw and clay or wood (to build make-shift houses); they were different because some lived west and some lived south.

Michigan: Pueblos were homes but longhouses were storehouses for food; with different houses they would know which house was theirs instead of having them all the same; longhouses were more convenient to move through (no steps or separations to negotiate); pueblos were city houses but longhouses were country houses. Many third

graders recognized pueblos as better shelter and couldn't see good reasons for making longhouses (or tipis, in Question 4) except that they were quick and easy to make.

Discussion

Most responses to Question 3 were accurate as far as they went, but stopped short of developing an explanation for why some Indians lived in pueblos but others lived in longhouses. Many were confined to descriptions of the materials from which the two forms of housing were constructed. Others drew accurate comparisons (pueblo was more durable, longhouses accommodated extended families), but stopped short of explaining why the different housing styles were constructed by the different tribes. Many students could not say or attributed the difference only to "different cultures." Only 26% understood that the key difference lay in the geography of the desert southwest vs. the eastern woodlands. This response was generated by half of the West Side students but only about 20% of the other students.

Tipis

Question 4 was intended to determine whether the students understood that the plains tribes used tipis because they were nomadic and therefore needed homes that were portable—easily taken down, transported, and reassembled. The interviewer began by showing the student a photo of a tipi and asking if the student knew the name for this kind of Indian home. If not, the interviewer supplied the name before going on to the next part of the question, to ask why these Indians lived in tipis. If the initial response did not mention portability, the interviewer kept probing for additional reasons.

Question 4. (Show photo of tipi). Some other Indians lived in this kind of home. Do you know what it was called? . . . (Elicit, or if necessary, give the name "tipi") . . . Why do you think that these Indians lived in tipis instead of other kinds of homes? . . . Are there other reasons why these Indians lived in tipis?

When asked the name of the Indian home shown in the photo, 12% of the students could not respond, 15% called it a tent, wigwam, or some other name than tipi, and 73% called it a tipi. Thus, this prototypical symbol of Native American life and culture (often presented to children in stereotypical ways) was familiar to three-fourths of these third graders. However, it was much more familiar to the West Side students (78%) and especially the Michigan students (91%) than the Harlem students (12%). This was one of the largest group differences observed in the study.

The second part of Question 4 asked why some Indians lived in tipis. Here again, a range of responses appeared, but only 10% of these mentioned portability and only 3% included the explanation that tipi dwellers needed portable housing because they followed the buffalo. The remaining students either couldn't respond or projected from their own experience to make reasonable guesses about the motives of tipi builders: Twenty-nine percent suggested that these people lacked construction materials or knowledge that would allow them to build any other kind of home, and most of the rest said that these people preferred tipis because of various personal or cultural preferences (tipis were quick and easy to build, the people liked being able to build a fire in them and have the smoke go out the top, they liked to paint designs on them or decorate them, they didn't waste things and tipis provided an opportunity to use animal skins, or tipis were small and hard to see from a distance so they helped the people hide from their enemies). These fanciful responses are

not surprising given the depictions of Indians in the movies, television programs, and children's literature that many of these students had encountered.

The three groups of students were more similar than different in their patterns of response to the question about why tipi dwellers lived in this form of housing, except that fewer Harlem students were able to respond to the question. The only other significant result suggested that the New York students were more likely than the Michigan students to ascribe tipi construction to poverty or low status (these Indians didn't have the means to build better houses), but this response was infrequent so the group pattern may not be reliable.

Rare and Unique Responses

West Side: One student called the tipi a tent and another called it a "Japanese thing." Explanations for tipi construction included: So they can hunt (expressed as a preference without mention of portability); they liked the look of it and could build a fire in it; it was family sized, you could paint on it, and it was portable so you could move away from wolves or other predators (goes on to say that these were peaceful people who would rather move than use their weapons against wolves); it was easy to build and you could have a fire in it to keep warm; it was family sized and you could get out quickly if your village was attacked (because the people were spread out over many small homes and most could get away while the attackers focused on a few of them). Finally, one student mentioned all of the following reasons: You could build a fire in it, its triangular structure kept things cooler (read this in a book), it provided protection in war because spears

couldn't penetrate the leather, and there were buffalo skins available as building material (despite all this, the student made no mention of portability).

Harlem: Five of these students called the tipi a tent and one called it a hut (the latter student said that he had never heard of a tipi when told the name). Explanations included: The tipi is an older form of housing than the other types; the tipi was easier to make than the other houses; when they put a light on, people could see them (student could not explain why this translucent quality made the tipis desirable); they used it when they went hunting, so they would be in or near the woods (akin to the use of a duck blind—no mention of portability); tipis were quicker and easier to build than houses (2); they could make a fire in them.

Michigan: Tipis were quick and easy to build (9); they offered good protection from enemies (6); you could build a fire in them for warmth or cooking (3); you could paint or decorate them; they lived in tipis so nobody could see them; they only built small homes because they knew that they would be moving on until they settled more permanently and built a big home; they liked to live alone where they wouldn't be disturbed by other people; they used all parts of the buffalo; they could hide in them from cowboys; it was part of their religion; they built tipis in the middle of nowhere to be near the buffalo (no mention of portability). Several of these third graders mentioned not wasting animal parts, often attributing this preference to "their religion."

Discussion

The West Side students and especially the Michigan students were much more likely than the Harlem students to know the name "tipi." However, they were not much

better at explaining why the plains tribes used tipis. Lacking knowledge of these tribes as nomadic, most of the students constructed responses around ideas about the personal or cultural beliefs of tipi dwellers or the idea that tipi dwellers lacked the economic resources or the construction knowledge or materials to build better houses. Some who failed to mention portability nevertheless associated tipis with buffalo hunting. Some portrayed tipis as temporary shelters used only during hunting, akin to the igloos used by Inuit hunters. Others conveyed the fanciful idea that tipis were easily hidden because they were small, so hunters could conceal themselves in tipis and wait for unsuspecting buffalo to happen by (this idea may have come from cartoons seen on television).

Taken together, responses to Questions 3 and 4 indicated that most third graders could accurately identify and compare the physical features of different forms of Native American housing, but few showed much understanding of geographical or cultural factors that help explain why these different forms existed. In particular, they showed little appreciation of pueblos, longhouses, or tipis as adaptations to environmental conditions (availability of construction materials) or cultural features (nomadic society). There was little mention of the portability of tipis or the defensive value of pueblos.

Our experiences in developing and field testing a curriculum unit on shelter as a cultural universal have turned up more evidence that primary-grade students often know that different forms of shelter exist, but do not know why they exist. For example, second graders typically already knew or easily learned that stilt houses are situated above marshes or periodic flood waters and thus remain dry, but they did not understand (or even appear to wonder) why people would live in marshes or flood plains in the first place.

To promote these kinds of understandings, primary-grade instructional materials and teachers will need to go beyond showing and describing different forms of housing. They will need to point out functions and cause-effect relationships that explain why the houses are constructed as they are and preferred over feasible alternatives. In the case of portable shelters or stilt houses, explanations will need to include descriptions of the economies of the societies (periodic migration to accommodate animal grazing or hunting, cultivation of crops that grow in marshes or flood plains). In other cases, explanations will need to emphasize adaptations to local climate and geography. For example, the steeply sloped roofs of homes in the mountain valleys of Switzerland are not merely picturesque but functional (they prevent dangerous accumulation of snow on the roof and cause the snow to pile up against the house where it acts as insulation). Other adaptive features of these homes might be pointed out at the same time (building them into the side of a slope and facing the sun minimizes their exposure to cold and wind). In teaching about tropical huts or jungle homes constructed primarily of vines and leaves, students might be induced to appreciate that these forms of housing not only capitalize on locally available construction materials but also incorporate features that make them well adapted to the climate of the region.

Life in Log Cabins

Questions 5-8 focused on students' knowledge about log cabins on the frontier. Follow-up probing sought to elicit comparisons of key features of homes and everyday living in the pioneer days vs. today.

Question 5. (Show drawing of cabin) Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? . . . How were they different from today's homes?

The first part of Question 5 encouraged the students to tell whatever they knew about log cabins. After they completed their initial statements, the second question was asked to elicit comparisons of log cabins and today's homes. Follow-up probing encouraged the students to identify additional comparisons as long as they were able to do so.

Questions 6-8 were designed to get at particular aspects of life at home in the pioneer days. Question 6 was intended to determine whether students realized that pioneers did not have running water and thus had to fetch their water from a well or nearby stream. **Question 6. How did people who lived in log cabins get their water?** (If the student does not appear to understand the point of the question or is unable to respond at all, probe by asking: **When those pioneers were living in those cabins back then and they decided they wanted a drink of water, what would they do?)**

Question 7 was intended to determine whether students realized that the pioneers depended on fireplaces (or perhaps woodburning stoves) for heat and did not have modern heating systems.

Question 7. How did they heat up their cabins?

If the initial response to Question 7 was vague or ambiguous, the interviewer would seek to elicit elaboration using "Tell me more about that" probes. Finally, Question 8 was intended to determine whether the students understood that the pioneers did not have electric lights and thus had to depend on light from the fire or from candles or oil lamps.

Question 8. What about light? After it was dark, did they have light in their cabins?

Again, "Tell me more about that" probes were used to elicit elaborations on initially vague responses. In coding responses to Questions 6, 7, and 8, any relevant comments that the student had made previously in responding to Question 5 were included.

The students produced quite a variety of responses to Question 5, most of them accurate. Most of these responses focused on the deficiencies of log cabins compared to modern homes: They were small or cramped living quarters (37%), they had no modern electricity or plumbing (27%), the doors and windows were primitive (26%), they lacked siding or had crude insulation and thus were drafty and leaky (22%), they had primitive, make-shift beds and furniture (17%), or they had no oven and the people had to cook in the fireplace (11%). In addition, 18% of the students noted that the people had to construct the cabin themselves (many of these responses were prompted by the illustration that showed a log cabin under construction).

There were large group differences in responses to Question 5. Almost half of the Harlem students were unable to say anything about log cabins beyond that they were constructed of wood or logs, whereas all of the West Side students and all but one of the Michigan students generated at least one response codable in categories for substantive responses. In particular, the West Side and Michigan students were more likely than the Harlem students to talk about log cabins as small or cramped, drafty or leaky, having primitive doors or windows, or lacking electricity or modern plumbing. They also were more likely to generate "other" responses.

When asked how pioneers got their water, a heavy majority of the students said that the water came from freshwater sources (83%) and/or that it came from wells or was

pumped up from under the ground (29%). Only two percent of the students suggested that pioneer log cabins had modern plumbing and only two percent mentioned saltwater sources (this response was more common among younger students in our initial study). Group difference data indicated that the West Side and Michigan students were more likely than the Harlem students to talk about wells or pumping water from under the ground. In addition, the Harlem students were especially likely to be coded in the infrequently used categories for failure to respond to the question and for mentioning saltwater sources. Finally, the Michigan students were more likely than the New York students to specifically mention lakes, streams, rivers, or other freshwater sources. The latter difference may reflect geographical location (Michigan is surrounded by the Great Lakes and rich in smaller lakes, rivers, and other freshwater sources).

Concerning how the pioneers heated their cabins, a heavy majority (92%) of the students said that they used the fireplace and/or a woodburning stove. No third grader said that pioneer cabins had modern gas or electric heating, but a few said that they only had candles or lanterns or that they had no heat at all and had to rely on warm clothes, blankets, and insulation. The only significant group relationship appeared because two West Side students but no students in the other groups mentioned getting heat from candles or lanterns. This does not mean much, however, because these students mentioned candles or lanterns in addition to (not instead of) a fireplace or woodburning stove.

When asked about lighting in pioneer cabins, most of the students said that pioneers had light from candles (56%), from the fire in the fireplace (42%), and/or from oil lamps or lanterns (28%). Only two percent suggested that they had light from electronic sources or flashlights, but nine percent suggested that the cabins were dark at night except for

moonlight. There were no significant group trends except for mention of candles, which was coded for 78% of the West Side students, 54% of the Michigan students, and 41% of the Harlem students.

Rare and Unique Responses

Question 5: Description of log cabins:

West Side: Vulnerable to winds and storms; warm and comfortable but not as secure or pretty as our homes; peaceful because they were out in the woods where there is a lot of carbon dioxide to breathe (sic) and they didn't require much material to build—just things that grew; they burned whale oil in the lamps (2); they were warm; they were unsanded and you could get splinters in your feet; they were cold and damp, the floor was primitive, and there was danger of fire; there was danger of fire and they were not as sturdy as brick buildings—could easily fall down; they could fall down if a log slipped out; no attic; they took a long time to build because they didn't have machines to build them with.

Harlem: They had a fireplace to keep it warm; cabins were better than tipis or straw homes because they wouldn't blow down easily.

Michigan: The roof was made of wood or logs (17); dirt floor (16); just one storey/no basement or upstairs (15); easily flammable (9); cabins were built out of the city by lakes where the Indians lived; they were built on stumps instead of flat on the ground; they featured wooden pegs instead of nails and were easily collapsible; we use glue and cement but they used nails; we have steps and railings instead of just a rock; our chimneys are on top of our houses rather than at the side; cabins were smelly and full of spiders; they lacked refrigeration so the people had to store food underground; they were easily

flammable and prone to collapse; they used rope instead of nails to hold boards together; they were cold and prone to collapse; they were not sturdy against wind and weather ("if you look at it in one way, it's just a whole bunch of logs put in a pile . . . like if you lived in your playhouse for years"). In addition, one third grader made a response that included two misconceptions: (1) the cabins were cold in the summer because hot air could only get in through a few cracks, and (2) the cabins could only be as long as the longest trees in the area.

Question 6, 7, 8

Most responses to these questions about water, heat, and light were accommodated in the coding categories. One West Side student said that pioneers didn't bring torches into the house because they feared setting the house on fire. One Harlem student said that the people kept warm by doing hot things that would keep them warm, and another said that they got light using jars of lightning bugs.

Discussion

In general, the students showed much more knowledge, as well as much less fanciful thinking, about the homes and lives of the pioneers than they showed about the homes and lives of Native Americans. This is probably due to some combination of exposure to movies and television programs for children set in pioneer days, the "Little House on the Prairie" books and the television series based on them, and the units on pioneer life and related children's literature experienced at school. Most of the students understood that pioneer families built their log cabins themselves (with help from neighbors), that the cabins tended to be small and cramped, that the beds and furniture

tended to be homemade and primitive, and that they lacked modern heat, light, and running water. Misconceptions were few and relatively minor (e.g., thinking that the cabins were prone to collapse because they did not realize that the logs were notched and interlocked at the corners).

Most students realized that the pioneers had light from the fireplace, candles, and oil lamps, heat from a fireplace or a woodburning stove, and water from a well or nearby stream. However, a few thought that the cabins lacked artificial light sources, that the people had nothing more than insulation and blankets to keep them warm, or that they had to travel some distance to get water and tote it back to the cabin.

As has been the case in all of our interviews, these responses indicate that the students' ideas about life in the past are distorted by a form of bias that historians call presentism: a tendency to devalue the past by emphasizing what it lacked compared to what is available today. It is true that pioneer lives were generally more difficult than modern lives and that log cabins were a less developed form of housing than modern homes. However, it also is true that log cabins can be appreciated as sturdy and functional homes, and as a cost effective way for the pioneers to meet their shelter needs given the available resources. Like other prototypical homes from the past (including various types of Native American homes), log cabins can understood as sensible human adaptation to time and place, and curriculum and instruction can be designed accordingly. Also, in teaching about log cabins and pioneer life generally, curriculum and instruction can help students appreciate what the pioneers were able to accomplish, not just what their lives lacked relative to ours. Fireplaces featured stone hearths and chimneys that allowed the people to cook in and heat up their cabins without filling them with smoke or burning them

down (at least, not often!). The cabins were built near an above-ground water source or else a well was dug right next to the cabin, so water did not have to be toted very far. The pioneers made their own candles and were able to use these, as well as oil lamps or lanterns, to light their homes after dark. Most furniture and many implements were homemade using relatively simple tools and thus were primitive by our standards, but if taken in the context of their time and place, they can be appreciated as elegantly designed, functional, and often artistic. Wells were not mere holding tanks but means of gaining access to underground water sources. Modern refrigeration was not available but the pioneers developed creative ways to keep foods cool or preserve them for storing before they could spoil. In these and many other respects, pioneer life can be taught in ways that develop empathy with the people and appreciation for their accomplishments, not just distancing or pity based on the ideas that they lived difficult lives and lacked modern conveniences.

Group differences in patterns of response to Questions 5-8 were less pronounced than the differences in responses to earlier questions. The main difference was that the Harlem students were less able than the other two groups of students to respond when asked to talk about life in log cabins. They were able to respond, however, when asked more specifically about water, heat, and light in those cabins.

Contemporary Home Purchase and Apartment Rental

Beginning with Question 9, the interview shifted focus from shelter in the past to shelter in contemporary society. Questions 9-16 deal with alternative contemporary housing arrangements, focusing on the two most common forms (home purchase and

apartment rental). Questions 9-11 focused on the trade-offs presented by these two forms of housing and on the reasons why people might prefer one over the other. Questions 13-16 focused on the economics involved in housing construction and home purchase or rental arrangements.

Embedded in this series was Question 12, which asked students about their family's housing. Reflecting the differences in housing patterns expected based on our sampling choices, almost all of the New York students said that they lived in apartments or condos, whereas three-fourths of the Michigan students said that they lived in houses. Of the remaining Michigan students, 15% lived in (small) apartment buildings, 9% lived in trailer parks, and one student lived in a townhouse. One Harlem student claimed to live in a house.

Reasons for Buying Vs. Renting Housing

Questions 9-11 addressed students' thinking about the relative advantages of living in a house vs. an apartment. Question 9 addressed the students' beliefs about most people's preferences.

Question 9. Let's talk about the homes that people live in today. Some families live in houses and some live in apartment buildings. Do you think that most people would rather live in a house or in an apartment? . . . Why?

A heavy majority of the students responded to Question 9 by suggesting that most people prefer houses. For these students, the interview continued with Question 10A. For the minority of students who said that most people would prefer to live in an apartment, the interview continued with Question 10B.

Question 10A. (If student says most people would rather live in a house) **If most people would rather live in houses, why do so many people live in apartments?**

Question 10B. (If student says most people would rather live in an apartment) **If most people would rather live in apartments, why do so many people live in houses?**

Question 11 was a further follow-up probe for the majority of students who first answered Question 9 by saying that most people prefer houses to apartments and then answered Question 10A by saying that people who live in apartments do so only because they can't afford homes or are waiting for a home to become available. Question 11 was asked to see if these students realized that, in addition to people who have to live in apartments but would prefer to live in houses, there are people who prefer to live in apartments and choose to do so even though they could afford to purchase a house.

Question 11 (if appropriate). Some people could afford to buy a house but they would rather live in an apartment. Why do you think they want an apartment?

As expected, location made a difference in these students' responses to Question 9. Whereas 96% of the Michigan third graders said that most people prefer a house, this was said by only 47% of the Harlem students and 39% of the West Side students. In contrast, whereas only 2% of the Michigan students said that most people prefer an apartment, this was said by 35% of the Harlem students and 28% of the West Side students. In addition, many more New York students (especially West Side students) said that they didn't know or couldn't choose because different people would have different preferences.

The students who stated that most people prefer houses to apartments were asked to explain why. The most commonly mentioned reasons were that houses are bigger or afford more space or rooms (57%), houses afford more privacy (36%), houses are yours to use,

equip, or decorate as you wish (30%), and houses offer features that you don't get in apartments (28%). Within these trends, two group differences are noteworthy. First, more of the Harlem students were unable to respond by generating one or more explanations. Second, the Michigan students were much more likely than the New York students to say that houses are yours to use, equip, or decorate as you wish. The contrast was particularly striking with the West Side students (43% of the Michigan students mentioned this factor, but only 6% of the West Side students did). This probably reflects the fact that most of the West Side students were living in condominiums or very expensive apartments, so that their parents were less subject to restrictive rules and pressures from building management than renters of more ordinary apartments typically are (and furthermore, whatever rules and restrictions might exist in their buildings were likely to be enforced in a much less heavy-handed manner than in apartment buildings serving people of modest means).

Students who said that most people would rather live in houses also were asked why so many people live in apartments. Most of them said that these people could not afford a house, and most of the rest said that they were waiting for a house to become available (either because they had purchased a new house that was not yet finished or because all available houses in the market were taken and they were awaiting an opening). However, three of the Harlem students gave "other" responses suggesting explanations more often cited by younger students in our initial study (e.g., some people prefer apartment buildings because they have elevators or because the people like noisy social environments).

[Note: The Chi-square data for Questions 9B and 10 are misleading because of the large difference between the Michigan students and the New York students in responses to

Question 9A concerning whether most people prefer a house or an apartment. When differences in the percentages of students in each group for whom these two questions were relevant are taken into account, the response trends for the relevant students typically are more similar than different (except for the differences noted above).]

Question 11 clarified for students that some people could afford to buy a home but choose to live in an apartment, then asked why they think such people would have this preference. Common responses included the ideas that the people want to live close to others (25%), want to use their money for something other than housing (20%), or only need or want a small space because they live alone or have a small family (19%). In addition, 17% of the students couldn't respond and 51% gave reasons that did not fit into the categories for common responses. Many of the naïve ideas and misconceptions that appeared commonly in the responses of the younger students in our initial study were infrequent or absent altogether from the responses of these third graders. None of them said that people prefer apartments to houses because they only need a place for a short time, and none confused apartment buildings with office buildings. Three students (all from Michigan) did confuse apartment buildings with hotels, however. One response that would likely be mentioned frequently by adults (that people don't want the work of keeping up a house) was made by only 9% of the third graders we interviewed.

Two group differences were noteworthy. First, none of the Harlem students said that apartment dwellers might need or prefer a small space, whereas this was said by 17% of the West Side students and 26% of the Michigan students. This makes sense as a social class difference: Children living in smaller or more crowded living quarters would be less likely than children from more advantaged backgrounds to be aware of the possibility that

some people with the means to afford larger quarters would nevertheless choose smaller ones. The other noteworthy difference was that the New York students were more likely than the Michigan students to suggest that some people prefer apartments because they want to live close to others.

Rare and Unique Responses

Unlike the Michigan students who overwhelmingly believed that most people would prefer houses to apartments, many of the New York students said that the question was difficult to answer because the answer would depend on the people's preferences. Responses along this line from West Side students included: I would want both an apartment in the city and a house in the country; older people might want an apartment but younger people might want a house; it depends on if you want to live alone or with neighbors; people who want to live in Manhattan have to get an apartment, but people who want to live somewhere else can get houses. In addition, one Harlem student noted that if you have a house, you can go out in the back at night and just relax and look at the stars, but if you live in an apartment building, the super will come to fix your plumbing, you are safer from robbers, and there are candy and cake sales in the building.

Why Most People Prefer Houses

West Side: You own all of it, not just part of it; people feel more comfortable in houses because they have several floors and more room; you get your water directly through your own pipe hookup (implying that it is cleaner or fresher than the water supplied to apartments).

Harlem: None.

Michigan: In houses you get light bulbs and are safer (more violence in apartment buildings); sometimes they don't let you out of apartments (student seems to be thinking of care facilities for the elderly), and you have a better view (more windows); apartments burn down easily; apartments have spiders; in houses you have more utilities--light bulbs and stuff that you can use; in houses you can have pets; you get to know your neighbors better; you have more windows and your own air conditioner and stuff; you don't have to pay to get room service--you can just do it yourself; apartments are on busy, noisy streets; in apartments you have to pay for water as you use it, instead of paying by the month; in houses you don't have to worry about robbers; some people don't like the view from high up; children can get hurt playing on apartment balconies, and homes are usually near schools; in a house, you're in the suburbs and not on a busy street; some houses are cheap.

Why Some People Live In/Prefer Apartments

West Side: Most people want apartments because they are mostly bigger than houses and have elevators so you don't have to walk up and down stairs, but some people have to live in houses because all the apartments are taken; apartments are less vulnerable to fire or weather events than a (wooden) house; apartments are safer in storms, they are all on one floor and therefore are less confusing and do not require you to walk as much, and this student wouldn't want to live way out in the country anyway; high apartments have nice views and everything is close by so you don't have to drive; likes the apartment he lives in because it's big, safer than a house, and near things they want to be near; apartments give more shelter in a bigger, safer building and you don't have to worry about bugs or take action to get rid of them; apartments are warmer, cozier, and easier for old people who don't have to climb stairs; there are no stairs and good views in high

apartments; the apartment is close to work or school; some apartments are very big and high ones have nice views; you can visit friends in the building without having to leave the building, so you are safer from potential harm; apartments offer better fire safety (fire alarms and fire escapes), high views, better heat (several New York students viewed houses as poorly heated or insulated, perhaps from experiences in summer homes), and better landscapes (this student preferred the look of a big city to areas "where they put up the houses").

Harlem: In an apartment, you don't have to fix things—the super comes; an apartment building is less likely to break in a storm and you can sit on your porch or go to the pool; apartment buildings have elevators, a playground, and more room; apartment buildings are exciting because there is so much going on there; apartments are safer because they are less vulnerable to tornados; apartments are bigger, have hallways, and more room; maybe people who prefer apartment buildings like noise or have friends living in the building; an apartment building is safer and more convenient to food stores, whereas if you live in a house, you have to hunt for food and might be attacked at night by animals (this student has lived in Africa, apparently in a rural area).

Michigan: Apartments are safer from robbers/tornados (3); apartments have pools, playgrounds, washers and dryers (3); apartments are quieter; some apartments are bigger (2); they like the view or they travel a lot; they don't like big spaces (in which to live); there are some things they like better in apartments and they don't have to spend so much time working on the house, so they can spend more time with their children; they like to live alone and don't want pets; apartments have elevators and some are in buildings with cafeterias downstairs and doctors who can take care of you (student may be thinking of

hospitals or institutions or apartment complexes for the elderly); some apartments are big and you don't have to wait to build an apartment before you can move into it; people who prefer apartments are just dumb; the apartment might be close to stores or workplaces or babysitters; you don't have to pay to get room service--you can just do it yourself (contrasts apartments with hotel rooms rather than with houses); the people travel a lot; they like loud, rowdy neighbors; it is easier to pay rent, because it takes a long time to pay off houses; they like to share or they travel a lot; many apartments are nice, fun to live in, and might be located near the homes of relatives; apartments offer good shelter and utilities, they're just not as big as houses; some people like a high view (2); you don't have to cook (thinking of hotels); you don't have to pay for water and electricity, and it's fun going up and down the stairways; some people enjoy apartment living; the apartment is all on one floor, so you don't have to walk up and down stairs; they like the elevators; some are close to where people work or the people may travel a lot; the apartment provides activities for the people who live there; it's cheaper, they don't want pets, and they just like living in apartments (2).

Discussion

The New York students did not show the same tendency as the Michigan students to overwhelmingly prefer houses to apartments and believe that the vast majority of other people would share this preference. On the contrary, a majority said that most people would prefer an apartment or that their preference would depend on other issues such as whether they wanted to live in the city or the country. The New York students also were much less likely to suggest that people live in apartments only because they cannot afford a

house, are waiting for a house to become available, or want to spend more of their money on needs and wants other than shelter.

None of the New York students confused apartments with hotels. A few suggested that apartments are larger than houses. They may have been thinking simply that an apartment building is larger than a house, rather than thinking that the inside living space of an apartment is greater than that of a house (although the latter is possible for at least some of these students, who live in very large apartments or condominiums but have spent time in relatively small summer houses).

The responses of the two New York groups were generally similar for those students who generated substantive responses, although the similarities are not immediately obvious because more Harlem students than West Side (or Michigan) students were unable to answer the questions. One interesting difference suggestive of social class influences was the fact that 26% of the Michigan students and 17% of the West Side students but none of the Harlem students suggested that some people who could afford a house would rather live in an apartment because they only wanted a small living space. All of the students appeared to assume that houses cost more than apartments, although this is not always the case.

The Economics of Buying Vs. Renting Housing

Questions 13-16 assessed students' understanding of certain economic aspects of shelter. Question 13 was intended to see if students understood that high demand on limited space creates a tendency to build upwards as well as outwards in big cities, or alternatively, to see if they realized that continuous building of houses would place people further and

further away from the city center. To help stimulate students' thinking, interviewers showed them a photograph of a highrise apartment building in a large city as they asked the question.

Question 13. In small towns, most people live in houses or small apartment buildings. But in big cities, many people live in very tall apartment buildings, like this one (show photo). Why do you think they have so many big, tall apartment buildings in big cities? (If student says because there are so many people in cities, ask: **Well, why don't they just build more houses instead of building those big apartment buildings?)**

Questions 14-16 addressed the economics involved in buying vs. renting housing. Question 14 was asked to determine if the students realized that people have to pay to live in apartment buildings, and if so, to whom this money is paid and for what. We were interested in whether the students understood that the people who collect rent in very large apartment buildings usually are not the owners, and that rent money provides the owners not only with reimbursement for their expenses in maintaining the building but also with an additional portion realized as profit.

Question 14. The people who live in apartment buildings--do they have to pay money to live there? . . . Who do they pay? . . . Why do they have to pay?

Question 15 focused more specifically on the difference between renting and buying, to see if the students understood that buying implies ownership and not just longer residence at the housing site.

Question 15. Some people <u>rent</u> a place to live, and some people <u>buy</u> one. What's the difference between renting and buying? (If student is confused or unable to answer this

question, break it into two separate parts: **What does it mean to rent a place to live? What does it mean to buy a place to live?)**

Question 16 was included to see if students knew anything about mortgage loans, particularly the core idea that a family can borrow money from bank, use it to buy a house, and then pay the bank back over a number of years. Four different follow-up probing sequences were used, according to how the student answered the initial question.

Question 16. Can a family buy a place to live and move into it even if they have only part of the money they need to pay for it? . . . How does that work? (If student doesn't know about mortgage loans and says that people have to save up until they have the full price, go on to Question 17.)

(If student speaks of the family borrowing from relatives or friends, probe for knowledge about mortgage loans from banks, but without mentioning banks directly: **What if their relatives couldn't lend them the money--is there some other way that they could buy the house?)**

(If student says something about getting a loan or money from a bank, probe for details. In particular, determine whether the student knows that the family gets all of the money it needs now but has to pay it back slowly over several years.)

(If student expresses basically correct ideas about mortgage loans, probe for understanding of the bank's profit motive for making those loans available: **Why are banks willing to give families money to buy houses, and then have the families pay them back later?**).

As in our previous study, a majority (60%) of the students said that so many big, tall apartment buildings are built in cities because of the demand for housing there. This is

a valid observation, but it does not address the question because it does not explain why so much of this housing takes the form of large apartment buildings instead of smaller apartment buildings or individual homes.

Also replicating our initial findings, the next most common response (25%) was the most sophisticated one, indicating that building up instead of out allows for more human use of the above-ground space. The West Side students were most likely to possess this insight: 56% percent of them were coded for it, compared to only 20% of the Michigan students and 6% of the Harlem students. Other common responses, made by small percentages of the students, focused on such ideas as convenience (it is easier to build one large building than many small ones), the builders' profits (they make more money from constructing large buildings than smaller ones), demand for highrise views, building one large building rather than several smaller ones does less damage to the environment, or only cities possess enough money, materials, or other resources needed to construct such large buildings.

Question 14 asked whether people who live in apartment buildings have to pay to live there, and if so, to whom they pay and why. Analyses indicated that all but one student (from Harlem) understood that people who live in apartment buildings have to pay to live there. When asked whom they pay, about half of the students said the owner of the building and about a fourth said the apartment manager. These figures were similar to those obtained in our original study. However, some interesting group differences emerged. First, whereas these two responses accounted for almost all of those obtained from the Michigan students, the New York students gave many more "other" responses.

Many of these "other" responses confused rent paid to apartment owners or managers with bills paid to utility companies.

When asked why apartment dwellers have to pay to live in their apartments, a majority of the students gave "fact of life" responses (everyone has to pay for housing, nothing is free, they won't let you stay there if you don't pay, etc.). Most of the rest indicated that rent money is kept by the owner of the building. However, as in our initial study, the emphasis in these responses was focused heavily on expense reimbursement, not profit. That is, although many students stated or implied that owners might use rent money for paying workers, utility bills, or other expenses involved in owning and maintaining an apartment building, few if any understood that renting is a profit-making business. There were no group differences in responses to this question.

Question 15 asked about the difference between renting and buying a place to live. Here, 12% of the students were unable to respond, 13% gave answers focusing only on the time dimension (renting is occupying the place for a limited time, whereas buying involves staying there for a longer time or permanently), and 74% explicitly stated an ownership concept (when you buy a place, it is yours to keep and use for however long you wish; you own it and you can stay there forever unless you decide to sell it; etc.). Perhaps surprisingly, the Michigan students were more likely than the New York students to explicitly state an ownership concept and less likely to mention only the time dimension.

When asked if a family could buy a place to live and move into it even if they had only part of the money needed to pay for it, 49% of the students said no, 10% said only if the owner agreed to this arrangement, 31% said yes but couldn't explain, and only 8% mentioned getting a loan. These findings replicate those of our initial study indicating that

few students are aware of mortgage loans at this age. There were no group differences in the response patterns.

Rare and Unique Responses

Why So Many Highrise Apartment Buildings are Constructed in Big Cities

West Side: These large buildings are safer from tornados (2); it's more work to build many houses than one large building; maybe other places don't have what New York City has to build with; because construction workers are bad people who keep putting up big buildings that "take up the light"; so people can have a little fantasy (i.e., live in an impressive building that everyone admires).

Harlem: People who live in tall apartment buildings like the view, and anyway that's just how they make housing in the city; they don't want to cut down so many trees; big buildings are safer from tornados; it's quicker and easier to build one building than many houses (2); cities have more people who can't afford houses; houses are not practical in the inner-city because you're surrounded by cars and noise.

Michigan: These apartment buildings allow people to live nearer to stores or other places they want to go (5); it's quicker or easier to build a few highrises than many houses (6); lack of money, materials, or resources to build many houses (4); people want highrise views (3); building the one large building saves trees and creates less pollution (2); building the big highrises is easier and uses less wood than building a lot of houses, and the buildings look nicer downtown than regular homes would; the city won't let them build all those houses, and there is no room left to build them anyway; people want to live in the city, near where they work; there is lots of traffic in cities, so kids can't be in the streets like

they can in suburbia; the big buildings have elevators for older people, make it easy to visit friends in the building, and provide parking under the building so you don't need a garage; not building all of those houses saves trees and saves open spaces for animals.

To Whom Do Apartment Dwellers Have to Pay Their Rent Money?

West Side: Six West Side students confused rent with taxes and said that you have to pay the government or taxes to the government, and one spoke of paying utility bills.

Harlem: Con Edison or the phone company (3); the superintendent; the person who sells it to them (confusing renting with buying); the community people that you pay bills to; the builder; the person at the bank.

Michigan: The government; the boss (who gives it to the mayor or President); the law person; the same people you would pay if you lived in a house (the government?); the landlord or the city.

Why Renters Have to Pay to Live in Their Apartments

In all three groups, the few students coded for "other" responses were students who confused paying rent with paying for utilities and thus said that you need to pay for the calls you make, the electricity you use, and so on.

The Difference Between Renting and Buying a Place to Live

Whereas the Michigan students often were familiar with the idea of buying a house but relatively unfamiliar with renting except for videos, the New York students typically were familiar with renting, leases, superintendents, etc., but vague about what is involved in buying a place to live.

West Side: Reflecting their social class, some of the examples of renting given by West Side students included summer houses and renting a villa in Italy for the summer.

Harlem: With renting, you use a credit card, but with buying, you use your own money.

Michigan: None.

Whether a Family Can Buy a House without Accumulating the Full Price

West Side: Two students knew about getting loans from a bank but did not know about interest (i.e., thought that you pay back the amount you borrowed but no more).

Harlem: One student drew an analogy with car payments but never explained the basic concept of a mortgage loan.

Michigan: One student used the word "mortgage" but couldn't explain it and made no mention of banks; another said that banks lend money because they "want to help people;" another knew about loans because she was paying off a bike loan, but she didn't know about interest or profits—she thought that banks are set up by the government to perform this role.

Discussion

Only 25% of the students understood that highrise apartments are found in large cities not only because of a greater demand for housing but because the demand for space near the city center creates pressures to build up instead of out. More than half of the West Side students understood this, compared to only 20% of the Michigan students and only 6%

of the Harlem students. Almost all of the students understood that apartment dwellers have to pay to stay in their apartments and at least half understood that this money goes to the apartment owner. However, most if not all of these students viewed this money as reimbursement for expenses and did not understand that a portion of this money is realized as profit. Some of the students confused rents paid to owners with taxes paid to governments or bills paid to utility companies.

Three-fourths of the students distinguished between renting and buying a place to live by articulating the meaning and implications of buying rather than only focusing on the time dimensions involved. Even so, there were noteworthy group differences: 93% of the Michigan students articulated the buying concept clearly, whereas this was true of only 56% of the West Side students and 35% of the Harlem students. Concerning whether a family could buy a place and move into it even if they had only part of the purchase price, fewer than half of the students thought that this was possible and only 8% made reference to banks, mortgages, or loans (and none of these students understood that banks charge interest for their loans). Overall, the New York students were more knowledgeable about renting and the Michigan students more knowledgeable about buying, but none of them clearly understood that banking (and more specifically making loans) and renting are profit-making businesses. Group differences were much less noteworthy in this set of questions.

Utilities in Modern Homes

Questions 17-21 assessed students' understandings of the mechanisms and economics involved in supplying our homes with water, heat, and light. Concerning water,

we wanted to know whether students understood that utilities collect water from fresh water sources, purify it, and pipe it into our homes under pressure. Concerning heat, we wanted to know if students understood the energy use and mechanisms involved in heating modern homes (in the case of most of their homes, that natural gas is piped in and burned in furnaces that heat air and then circulate it throughout the house). Concerning light, we wanted to know whether students understood that lights require electricity, and if so, what they knew about what makes the light shine when the switch is turned on.

We also asked students whether we have to pay for our heat and light, and if so, whom we pay and for what. We wanted to see if they understood that we pay for the gas and electricity that we consume. Pilot interviews also had asked about paying for water, but we dropped this question because all students understood that people use water and typically (except for people who have their own wells) pay a utility company for what they use. However, they were less clear about what we use to create heat and light. This difference in understanding was related to the fact that water supplied to homes is used directly without transformation (except for heating some of the water to create hot water), whereas transformations are involved in the creation of heat and light (i.e., utility companies do not supply us with heat and light pér se; instead, they supply us with energy which is converted into heat and light after it enters our homes).

Question 17. Inside our homes, we use water when we turn on our faucets. Where does that water come from? (If student says from pipes under the sink, keep probing for the original source of the water, e.g., **OK, but where is the water piped in from?)**

With students who said that water comes from a well, interviewers probed for knowledge about homes served by municipal water systems (e.g., "What about houses that don't have their own wells--where does their water come from?").

Question 18 asked about heating. Follow-up probing was differentiated according to the way that the student answered the initial question.

Question 18. Our homes are heated when the weather is cold. Where does that heat come from? (If necessary, probe to see if student understands concept of central heating--water or air heated in a boiler or furnace, then circulated around the house.) **Individualize your probing as follows.)** (If student says heat comes from furnace): **How does that heat get from the furnace to the different rooms in the house?** (If student says the heat comes from register)**: OK, you can feel warm air blowing out, but where does that warm air come from? . . . Is there something that makes the heat?** (If it is clear that the student's home is heated with dispersed electrical heaters, portable space heaters, or something other than a central heating system, probe for knowledge of the heating system at school): **Here at school we have warm air blowing into the room when the heat comes on** (show heat register in the interview room). **Where does that heat come from?**

. . . What makes the heat?

Question 19 was intended to see if students understood that we burn fuel and/or use electricity when we heat our homes, and therefore we have to pay (either directly by purchasing fuel or indirectly by paying utility companies for the gas or electricity we use).

Question 19. When we use heat in our homes, do we have to pay for it? . . . Who do we pay?. . . . . Why do we have to pay? (If student is able to respond to the last question

about why we have to pay, probe to see if student can say anything about consuming fuel, energy, or electricity).

Question 20 was intended to see if students knew anything about how electric lights work.

Question 20. Families light up their homes by turning on lamps or lights. How does that work? (If initial answer indicates that electricity is involved but does not offer any further explanation, probe by asking, **What happens when we turn on the switch?**)

Question 21 was intended to see if students understood that we use electricity when we turn on our lights and thus have to pay for whatever electricity we use. Many students understood that their parents purchased light bulbs but did not understand that they also paid for electricity used when running the lights after they got them home.

Question 21. Do families have to pay for the lighting in their homes? . . .Who do we pay? . . . Why do we have to pay? (If student only mentions paying for bulbs, ask: **OK, we buy light bulbs and then bring them home to use them in our lamps. Do we also have to pay for using them--does it cost us to turn our lamps on and leave them on?**).

A slight majority (53% of the students said that household water comes from freshwater sources (rivers, lakes, underground water), or in a few cases, mentioned saltwater sources but then spoke of some purification process that removes the salt. Of the remaining students, 11% could not respond, 20% mentioned saltwater sources (oceans, seas), and 18% mentioned other sources such as sewers, drains, or reservoirs. The Michigan students were better able than the New York students to answer this question, being less likely to fail to respond and more likely to mention only freshwater sources. The New York students were more likely to mention "other" sources.

Concerning what happens to water before it is sent to our homes, a substantial majority (83%) of the students understood that water is piped into homes through underground pipes. In addition or instead, 40% of the students mentioned that the water is purified before being sent, 10% mentioned that it goes to a water tower after being purified, 11% could not respond, and 3% made some "other" response. Once again, the Michigan students were more able to respond to the question and specifically more likely to mention underground pipes than the New York students. The three "other" responses all came from West Side students.

Concerning the source of heat in homes, 6% of the students could not respond and 12% said the sun. The remaining students produced a variety of defensible responses: forced air from a furnace (36%), a heater or furnace (27%), the heat registers (18%), the heat/power company (12%), boilers or radiators (12%), fire or fireplace (8%), electricity (4%), or "other" (10%). Students coded for heater/furnace responses made reference to a heater or furnace (or to "that thing down in the basement" or some similar description) but were unable to explain further, whereas students coded for "forced air from furnace" responses gave recognizable descriptions of the workings of a forced-air furnace. None of these students used the term "forced-air" and only some of them used the term "furnace," but they all described heat as warm air that originates in a heater or furnace, circulates throughout the house, and comes into rooms through registers. Students coded for "heat register" responses also depicted heat as warm air and noted that it enters rooms through registers, but they could not say anything about where this warm air comes from before it reaches the register. Again, none of the students used the term "register." Instead, they

used terms such as "grate" or referred to "that thing in the wall with the holes in it that the heat comes out of," etc.

Asked how home heating is produced, 13% of the students could not respond and a few suggested that electricity is inherently hot or generated some other unusual response. As in our initial study, however, the majority of students communicated one of three main theories. Once again, the most popular of these was what we labeled the "black box" theory, verbalized by 51% of the students. These students indicated that the heat comes from a furnace, heater, or boiler but were unable to explain how the process works. Many fewer students were coded for the other two theories. Eighteen percent articulated the correct "firebox" theory: within a furnace (or heater, or boiler, etc.) fire is used to heat the air (or water) which is then circulated throughout the house. The remaining theory, articulated by 12% of the students, was that heat (typically construed as warm air) is sent directly to the house by the heat or power company. Students who expressed this theory believed that heated air is piped underground to our houses, where it is either circulated immediately or else stored in the furnace until it is needed. If they mentioned the furnace, students who held this theory viewed it merely as a holding tank for heat piped in from the utility company, not realizing that furnaces house fires that heat air on site.

None of the three main theories showed significant relationships with location, although it may be significant that none of the Harlem students articulated the "power company sends heat" theory (probably because so many of these students lived in buildings featuring steam heat rather than forced-air systems). The significant relationships that did appear for responses to Question 18B indicated that the Harlem students were more likely than the other students to unable to respond to the question and that the New York students

were more likely than the Michigan students to say that electricity is inherently hot and thus heats the house (but this response was given by only three students, so the group difference is probably not reliable).

The Michigan students were more likely than the New York students to mention a heat or power company, or to speak of heated air forced throughout the house from a furnace. Responses stating that heating comes from electricity were made exclusively by West Side students. Boiler/radiator responses were made exclusively by New York students, especially Harlem students. Finally, the New York students made more "other" responses than the Michigan students. Most of the differences in responses to Question 18A occurred because most of the Michigan students lived in homes or apartments that featured forced air furnace systems, whereas many of the New York students (especially the Harlem students) lived in buildings that featured steam heating systems.

Students produced quite a variety of responses when asked whether we pay for our heat, and if so, whom we pay. The most obviously correct response (we pay a utility company) also was the most common response, although it was given by only a third of the students. Of the remaining students, some thought that we do not have to pay for heat (19%), weren't sure whether we have to pay or not (7%), or knew that we do have to pay but couldn't say whom or for what (6%). Among those who mentioned paying someone other than a utility company, 20% named a government agent or agency, 2% said that we pay people who repair our furnace, heater, or boiler, 1% said that we pay a bank, and 18% gave "other" responses. New York students (especially Harlem students) were more likely to say that we do not have to pay for our heat or to say that they were not sure. Michigan and West Side students were more likely than Harlem students to say that we pay a utility

company or a government agency. The latter differences reflect the more fundamental fact that a majority of the Harlem students did not think that we have to pay for heat or were not sure (as opposed to knowing that we have to pay for heat but believing that we pay some person or agency other than a utility company or the government).

Concerning the processes involved in providing light to modern homes, six percent of the students could not respond but almost all of the others knew that electricity was involved. Most (80%) were unable to elaborate beyond this "black box" explanation. However, 12% were able to go beyond this and articulate some theory of how the lights in our homes work. Of these, 10% provided explanations that were simply incorrect (although often indicative of creative and intelligent thinking) or only partly correct, and only two students (both from the West Side school) generated basically accurate explanations. The group comparisons indicated that the Harlem students were more likely than the other students to be unable to respond to the question and that the West Side students were marginally better than the Michigan students in generating something more substantive than black box theories (including the two students who generated accurate explanations).

Question 21 asked whether families have to pay for the lighting in their homes. Surprisingly, this question generated a different pattern of answers from those generated by Question 19 (concerning whether families have to pay for the heat in their homes). This time, only 2% of the students said that we don't have to pay for heat, only 2% were unsure, and only 2% said that we do have to pay but couldn't say whom or for what. A majority (56%) accurately stated that we have to pay a utility company for the electricity used in lighting our homes, and another 9% more vaguely stated that we have to pay the people

who give or send us light. Finally, 3% of the students said that we have to pay for light bulbs but not for using them, and 26% gave "other" responses. Group comparisons indicated that 69% of the Michigan students correctly said that we have to pay a utility company for the electricity we use, whereas this response was generated by only 44% of the West Side students and only 29% of the Harlem students. In addition, the only two students who were unsure about paying for lighting were West Side students, and all of the vague responses (that talked about paying the people who give or send us light without mentioning a light company, power company, etc.) came from the West Side or Harlem students rather than the Michigan students.

Rare and Unique Responses

How We Get Our Water

West Side: Six West Side students mentioned reservoirs. Some of them conceived of the reservoir as the original water source (akin to a lake), not as a holding place for filtered water or a source of pressure. Two of them did imply that the water reaches homes under pressure, and these were also the only two West Side students to mention purifying the water. Some students thought of reservoirs as catching rain and even implied that the water authority would have to cut water use if rain was sparse. Specific responses: from rain, into the gutters; every city and town needs a reservoir for its water supply; the water comes from a "water supply somewhere;" water is pumped into houses; the water comes from the ocean but the salt is filtered out of it; rainwater kept in a reservoir. In addition, one student provided the following lengthy statement: "First it gets from the sea into the air and then it drops to the ground and gets soaked down and then they pump all the water

up . . . they pump a lot of water up from the ground and it gets taken to a water conservation area and they clean the water. Like 100 feet of water cleaned from really big filters to really tiny filters, so at first all the big things get out and then it gets small to only tiny particles, and the last one is enough to that only every minute a drop of water can fall down. (How does it get from there to our faucet?) It goes to a pumping station that gives it power to go around and every few hundred feet there's another pumping station underground and it makes the water keep on going, but usually they don't have pumping stations because they just make the pumps go downhill. It's slightly downhill so it's just going downhill through the whole city and they usually have a pumping station under a building to give pressure for it to go up into apartments." [Says that he learned this from watching a television show called New York—the City Beneath Us.]

Harlem: Sewers (2).

Michigan: The Board of Water and Light [a local utility]; "a drain thing;" they remove salt from saltwater; wastewater goes from homes to sewers to oceans, then back to rivers, from which it is piped into homes for reuse (this student and one other apparently thought of rivers as purifiers of water).

How We Get Heat in Our Homes

West Side: They burn gas in furnaces and then like hot air goes into the radiators, but the cleanest is the electric heat if you want to keep your house smelling nice; heat comes up from under the ground (where it is warm, ultimately because of radiation from an inner core of "hot lava" in the earth); the boiler in the basement gets hot because "it runs on a fuse or something" and then heat travels through electrical wires into the rooms; the city maintains heat (hot air) underground all over the city, and turning on your heat releases it

(via pipes) into your house. Several West Side students referred to steam heat but usually had only a black box (not firebox) theory about the source of the steam.

Harlem: Heat comes from matches when we light the stove; from the oven; steam comes up from under the ground and heats the radiators; we burn coal to heat water to make steam for the radiators (the only complete explanation from a Harlem student); from the oven and the fireplace; radiators plug into electric outlets to let "fire" into them. Another student talked about supplementing building heat by putting a pail of water in the oven to make steam. Finally, one student first said the sun, then spoke of natural heat coming up from under the ground, then said that the heat in the radiator is hot water or steam but couldn't explain how it is heated.

Michigan: Most Michigan students were aware of thermostats (although they didn't use this word) and talked about using them to control temperature in the home, but couldn't explain how the process works. Some students (although usually younger ones) lacked vocabulary or confused terms by referring to registers as heaters, to furnaces as dryers, to fans as air conditioners, or to pipes as tubes, sewers, hoses, or drains. Those who spoke of the power company sending "heat" to your house usually pictured a particular person accomplishing this by pushing a button in response to some signal received electronically from your home when you use the thermostat to call for more heat. Specific responses: The utility company uses gas fires to heat air and then send it through pipes to our homes; the utility company sends heat to our furnace, which pumps it through our house (furnace as pump only); the heat comes from the sun, from underground, or from "heat that goes around Michigan;" the heat is piped in from California, Florida, or Hawaii; understands that the heat is created by burning gas but thinks that this happens underground and the

furnace is merely a pump or fan used to bring it up and circulate it through the house; the utility uses machines to heat air at a central location, then sends it to our homes; heat comes up from under the ground—it's warm there; describes solar heating panels (light collectors) that convert to electricity and heat; talks about solar energy, electricity, and heaters that are like fans that blow hot air (but cannot explain how).

Whom We Pay for Our Heat

West Side: We pay the superintendent, who adjusts the heat for us.

Harlem: The landlord/building owner (3); the building manager or a utility company.

Michigan: You pay the landlord and he pays the government (this student also said that heat outside the home comes from rain which contains tiny "pellets" of hot air that are released when the drops splash down); the person you bought the house from; you pay the landlord who pays "somebody" who gives us the heat; the person you bought the furnace from; the bank; the guy who installs the heater; the factory that made the furnace (you pay them once a month for using it); the people who built the house or sold it to you; you have to pay for the furnace but not for using it; you pay the company that installed the heater (but not for the heat).

Where Our Lighting Comes From

West Side: If you put it really bright, the lamp gets really hot; a jolt of electricity goes into the bulb and activates a gas that lights it up. The following student made a lengthier explanation: "The light bulb has a little blinky thing in the middle (filament) that is so thin that light has to squeeze through, and it's making heat and the coils glow. (So what does the switch have to do with it?) The switch has a little piece of copper right after

it and when you switch it, it moves the copper so that when it touches, there's like a piece over there and when you flip the switch, the piece can go up and the copper isn't touching it, but when the switch is down and you turn it on, it's touching a little piece there and a little piece here so the electricity can get through." (Says that he learned this from reading *Magic School Bus*.)

Harlem: Throwing the switch lets in (white) electricity; the ends of the wires going into the bulb burn and give off light—eventually they burn down and the bulb is done.

Michigan: The utility company sends light (literally) through wires to your lamps; rivers "circle around" dams to make electricity and when this electricity reaches a bulb it sparks between two wires to make light; fuses are switches that make lights go on; a bulb lights up "because it's got so much energy" after we throw the switch; electricity is put into bulbs and when you use them, it gets hot and the bulb lights up; there are two wires inside the bulb; bulbs contain a little ball of fire that "comes up" when you turn it on (apparently like a pilot light leading to a bigger fire when you turn it on); little wire things in the bulb somehow like catch fire, but it's not that—it's really bright and lights up the bulb; you put a battery and it lights the wick inside the bulb; the bulb has a wire that creates a lot of energy and lets off light; the utility company gets electricity by capturing lightning during storms.

Whom We Pay for Our Light

West Side: The government (4).

Harlem: The super (2); you pay your electric bill or the landlord; you pay the bank and the money goes to the landlord; if you keep the light on long enough, you have to pay

for it in rent (this student may have had experience with conservation incentives); renters pay landlords but homeowners don't have to pay.

Michigan: The person you bought the house from; you have to pay the utility company to fix broken wires (but no mention of using electricity); the city; you pay the landlord, who in turn pays "somebody who gives us light;" the tax collector; the taxpayers (the government); the city; you pay for wires and light switches, but not for using them.

Discussion

Most students were clearer about water than about heat and light, but even so, only 53% of them correctly identified lakes, rivers, groundwater, or other freshwater sources in explaining where our water comes from. Most of the others either couldn't respond or mentioned saltwater sources. Most understood that water is piped into residences through underground pipes and about 40% mentioned water purification, but for some of the latter students this purification was limited to desalinization (i.e., they spoke of removing salt from the water but made no mention of removing waste products or harmful chemicals). A few students thought of rivers as purifying agents, and some of them envisioned water as flowing from oceans through rivers into inland lakes, thinking that the salt is filtered out of the water during the process. In general, the Michigan students knew more than the New York students about the sources of water and about piping it to residences through underground pipes.

Only 10% of the students mentioned the water going to a water tower before flowing into residences, and few of them understood the role of water towers in creating hydraulic pressure to power the flow in the system. Similarly, only a few New York

students mentioned pumping stations. We were not surprised by these findings because our observations of lessons taught to first and second graders indicate that one commonly asked question is how water can flow upwards from underground pipes into residences. Most of these students (and apparently most third graders as well) do not realize that water arrives at residences under pressure or understand the role of water towers or pumping stations in creating this pressure.

Responses concerning heat indicated that students were familiar with the controls for adjusting heat in the house but not very aware of the sources for such heat. Some recognized that hot air comes from registers or steam heat from radiators, but could not explain further. Of those who were able to trace the heat back to a furnace or boiler, many espoused only "black box" theories without understanding that the furnace or boiler contains a fire that heats the air or water. Students familiar with forced-air systems sometimes believed that the utility sends "heat" directly to residences (in which case the furnace, if mentioned at all, was depicted as merely a storage tank or pump for the received heat, rather than a firebox in which the heat is created). Several students believed that it is warm under the ground and this underground heat "just floats up" into our homes. In general, the Michigan students were more familiar with forced air furnace systems and the New York students (especially the Harlem students) were more familiar with steam heat systems.

Only 18% of the students understood that the heat is produced on site in a furnace or boiler and then circulated through ducts or pipes. In discussing findings from our initial study, we noted that forced-air systems involve more radical transformations of the raw material supplied by the utility than steam heating systems: In forced-air systems, natural

gas is consumed in the process of heating air, whereas in boilers, water is merely heated without changing its familiar appearance (hot water) or is changed into a form that is familiar to most (boiled off as steam). Given this difference, we speculated that children living in homes heated with boiler/water systems might be more able to generate "firebox" explanations than students from homes heated with furnace/air systems. This proved not to be the case, however: New York students were no more likely than Michigan students to give firebox (rather than blackbox) explanations of the source of home heating.

Only about two-thirds of the students clearly understood that we pay for heat. About half knew that we pay utility companies and most of the rest thought that we pay government agencies. The latter response was correct for those Michigan students who lived in the city, because its utility (The Board of Water and Light) was owned and operated by the city. However, independent utilities not connected with governmental agencies served the residences of the New York students and the Michigan students who lived in the suburbs. The main group difference in responses to this question appeared because a majority of the Harlem students thought that people did not have to pay for heat, whereas majorities of the West Side and especially the Michigan students understood that they do pay.

Over 90% of the students knew that electricity is involved in creating light, but most of these could only advance a black box theory to explain the process. They knew that one must throw a switch to allow electricity to enter the bulb, but were unable to explain how the arrival of electricity causes the bulb to light up. Only 12% of the students were able to advance theories going beyond this point, and only two of those theories (both

expressed by West Side students) were accurate. The Harlem students were less often able to respond to this question than the students in the other groups.

Whereas many students (especially those from Harlem) thought that we do not have to pay for heat in our homes, almost all of them understood that we have to pay for lighting. Most understood that we pay the utility company (either directly or via the landlord), although three students thought that we only have to pay for light bulbs, not for using them (this response is more common among younger students). The Michigan students were more likely than the New York students to state specifically that we pay a utility company for lighting, whereas the New York students were more likely to be unsure whom we pay or to make vague reference to paying the people who give us the light.

Ideal Future Homes

Questions 22-24 asked students to envision their ideal future homes and talk about their locations and features. This set of questions provided students with opportunities to think about the kinds of homes they might want to live in when they are adults. Question 22 opened the topic in a general way.

Question 22. When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for? . . . (If necessary, ask: **Would you want the home to have any special rooms?)**

Interviewers kept probing (e.g., "Anything else about the home you would be looking for?") so long as the student was able to continue generating criteria. When students shifted focus from listing features of the house to listing things that they would

like to have in the house (video games, etc.), the interviewer refocused them on the features of the house itself.

The next question provided students with opportunities to identify anything special about their ideal homes.

Question 23. Is there anything unusual or special about the home you would want?

Finally, Question 24 was included to see if the students realized that families consider not only the qualities of the house itself but where the house is located with reference to jobs, schools, etc., and that they also seek to avoid undesirable locations.

Question 24. What about the location of the home—would you want to live near certain things? . . . Would you want to live far away from certain things?

In describing their ideal homes, some students identified general features (size, style, color, house vs. apartment, etc.), others identified specific rooms or "extras" (basement, deck, swimming pool, yard, etc.), and some identified both. A majority (72%) of the students mentioned one or more specific rooms. Bedrooms were mentioned most commonly (51%), followed by living/family rooms (33%), bathrooms (33%), kitchen (29%), dining room (17%), playroom (16%), guest room (6%), and laundry room (3%). In addition, 19% of the students mentioned other rooms such as storage room, office, library, or display room. The group profiles were generally similar, except that the West Side students were more likely than the other students to mention "other" rooms and the Harlem students were more likely than the other students to mention bathrooms. Both of these differences make sense given the contrasting socioeconomic backgrounds of the students. More of the West Side students came from privileged backgrounds that included large

residences with many specialized rooms, and many of the Harlem students came from impoverished circumstances in which many residents shared a single bathroom.

About half (51%) of the students mentioned "extras." These included basements (15%), yards or outside play areas (11%), swimming pools, hot tubs, or Jacuzzis (10%), porches, decks, or patios (7%), fireplaces (4%), landscaping (4%), or a garage (2%). In addition, 20% of the students mentioned "other" extras not included in the previous categories. Once again, the profiles were more similar than different except that the West Side students mentioned more "other" extras.

Almost three-fourths (74%) of the students identified general features of their ideal homes. The most common general feature mentioned was size, with 43% of the students indicating that they wanted their home to be large (or at least, large enough to accommodate the family). In addition or instead, other students made reference to a particular style of home such as a two-storey home or a ranch house (19%), specified that the residence would be located in a suburb or semi-rural area (12%), identified the color or colors that it would be painted (8%), specified that it would be located in a warm climate (3%), or identified "other" general features such as placement on a hill or near a lake or beach. The Harlem students were much less likely than the West Side or Michigan students to mention these general features of ideal homes. Otherwise, the response patterns were similar except that the only students to mention location in a warm climate were West Side students.

A substantial majority (84%) of the students mentioned one or more things that they would like to live near, and a smaller majority (60%) mentioned one or more things that they would like to live far away from. In talking about what they would like to live near,

20% mentioned relatives, friends, or neighbors. Other categories included food stores or restaurants (17%), woods (16%), the school that their children would attend (15%), places for children to play such as playgrounds, parks, or skating rinks (12%), a body of water or a swimming pool (8%), their own worksite (7%), or places to take children such as a museum, aquarium, zoo, or amusement park (3%). In addition, 26% of the students named "other" attractions not included in the previous categories. These findings replicate findings from our initial study indicating that children are relatively unaware of the importance that most adults attach to convenience to their worksite as a determinant of housing location (only 7% mentioned this factor).

None of the Harlem students mentioned wanting to live near relatives or friends, although this preference was expressed by 17% of the West Side students and 28% of the Michigan students. We have no interpretation to suggest for this difference. Also, the Michigan students were more likely than the New York students to mention living near food stores or restaurants. This difference is not surprising given that food stores or restaurants were located within a block or two of the New York students' residences, whereas this was not true for most of the Michigan students.

Concerning things that they would like to live far away from, the most common responses were the city or urban density (20%), traffic or noise (17%), crime (11%), and factories, junkyards, dumps, smokestacks, or pollution (9%). In addition, four percent named people that they didn't like, three percent named dangerous animals or pesky insects, and 25% named "other" things to avoid. Group differences in responses to this question mainly reflected base rates of responses to it, rather than the particular patterns of responses elicited. Only 24% of the Harlem students named one or more things that they

would want to live far away from, whereas such things were named by 56% of the West Side students and 72% of the Michigan students. Interestingly, when the Harlem students did name things they would seek to live away from, their responses focused on crime. Crime was included among the responses from the West Side and Michigan students, but these students were more likely to mention avoiding urban density and the traffic and noise of the city and almost as likely to mention avoiding factories, junkyards, dumps, smokestacks, or pollution. In other words, the West Side and Michigan students talked about avoiding a cluster of negative aspects of urban life, whereas the Harlem students focused exclusively on crime.

Rare and Unique Responses

Special rooms in the ideal home

West Side: A special room for the dog; a library room and a room to do art and dancing; a library and rooms for pet cats and fish; a study, a giant living room with a big television built into the wall, and a secret room with secret passageways; big closets; a den and a storage room; lots of closets, a bathroom for each bedroom, an office, and a computer room; an office.

Harlem: A maid's room; computer room.

Michigan: Closet and room for animals; quiet room; baby room; den; time-out room to send the children when they are disobedient; storage room; music room; tornado shelter.

Special extra features in the ideal home

West Side: A house with stairs in it and a flat roof with a swimming pool built into it; a nice view (high apartment), unique interior décor, and secret passages; an elaborate electronic and laser security system that would include DNA recognition (this student had visited relatives in Israel); extra large closets and coffee table; air conditioning; long hallway; lots of fire alarms.

Harlem: Would include robots to do chores like washing clothes and push buttons to do things like bring the television to wherever she was sitting; a pull-out couch; three couches and reliable lighting; lots of brass; white wooden stairs and a balcony off the bedroom that you could look down from (based on grandmother's home in Puerto Rico).

Michigan: Golf and basketball facilities; flowers, garden, and badminton; metal doors, lots of lights, and cross ventilation; sliding glass door in the back; special passageways through closets to link to the children's bedrooms; secret passages.

General features of ideal homes

West Side: Three of these students said that they would prefer an apartment and two others said that either an apartment or a house would be fine (depending on where they lived). Several of these students were first- or second-generation Americans who spoke of visits to their homeland or even wanting to move back there. Several mentioned security concerns. Specific responses: A mansion filled with beautiful furniture; a nice big log cabin; a house that is just right—big enough but not too big; a big apartment with a long hallway; a house in good repair, maybe in Italy.

Harlem: Half of the Harlem students mentioned apartments in talking about their ideal homes, and one even specifically mentioned living in a project. Some responses were

immature for third graders (e.g., living with his sister when they grow up) and several were quite barren, picturing a single room or talking about bare necessities such as food or light in describing what they would like to see in their ideal home. Specific responses: Any place they give me—I get one room with a light bulb, refrigerator, and stuff for the room; a nice apartment in a nice area; a project; starts talking about an apartment but then shifts to the idea of living in a hotel with restaurant and shops included.

Michigan: A pretty house; near a lake; brick; two-storey and brick; two-storey in the suburbs; three-storey with loft and trapdoors; well insulated; safe and well made; a small house; nice and comfortable; a cottage home; good quality and located away from noise, etc.; a two-storey home or else a cabin in the mountains—efficient and environmentally friendly rather than big and gaudy. In addition, many third graders added two- or three-storey and/or brick to their descriptions.

What the ideal home would be located near

West Side: Near a church; in the city and near a lot of stores; near toy stores; near museums, libraries, bookstores, police and fire stations; near a bookstore.

Harlem: Near a bridge (to provide an escape route "in case something happened"); near another home; near animals like deer; near a hospital; near Toys R Us.

Michigan: Gas station, bait store; mall (3); in Italy or in Paris by the Eiffel Tower; hospital (2); mall, gas station; the city; mall, doctors; the equator (warm climate); a bank; in the country where we could grow vegetables; fire, police, hospital.

What the ideal home would be located far away from

West Side: The ocean (mentioned by two students who were unhappy with the bad smell); cold weather (3).

Harlem: One student said that she would not want to live in Atlanta, South Carolina, the Bronx, or Queens (apparently because she has relatives in these places and doesn't like them).

Michigan: Crabs and birds (student is allergic to these); bees; farms; from his sister and from the woodchucks that live in his backyard; Russia; animals, forests; my brother; woods, anywhere that's bad; her brothers who kept bothering her to do things for them; in the country—there are not many friends out there; my brothers and sisters; bad weather areas; snow; jails, motels; way out where you're too far away from everything; farms (they stink).

Discussion

A few students playfully depicted mansions equipped with extensive sports or recreation facilities, but most students were relatively realistic in describing their ideal future homes. Group differences were observed relatively infrequently, and most of these appeared related at least as much to the students' socioeconomic backgrounds as to their geographical locations.

Most of the Michigan students depicted a comfortably large house located in a quiet, family-oriented suburban or semi-rural neighborhood. Many added that this home would be located near those of relatives or friends and close or at least convenient to places to shop and take children, but removed from urban density, crime, traffic, noise, etc. As far as they went, most of these students' descriptions emphasized themes similar to those that likely would have been emphasized by their own parents, except that only seven percent of them indicated that their ideal home would be located close to their workplace and only

19% mentioned their children's schools (and all of these responses focused on the schools' location without mentioning their quality).

After completing our initial study, we wondered about the extent to which this image of suburban family living projected by the Michigan students simply reflected a modestly enhanced version of the lives they were already familiar with, vs. the extent to which it represented a contemporary version of the American Dream likely to be articulated by children from any background located anywhere in the country. The findings just reported provide more support for the former than the latter hypothesis. The New York students were more likely than the Michigan students to think of their future ideal home as an apartment or condo located in Manhattan, and certain aspects of many of their responses reflected their geographical and socioeconomic backgrounds.

The West Side students shared the Michigan students' interest in larger or even sumptuous living quarters, but they were as likely to mention urban as suburban locales for their ideal homes. They also were more likely than other students to mention special rooms that didn't fit into the "rooms" categories, to mention "other" extras that didn't fit into the "extras" categories, and to talk about living in a warm climate or another country. The "extras" mentioned by West Side students tended to be expensive furniture or décor features, or (in a few cases) security features, whereas the "extras" mentioned by the Michigan students were elaborations on their "big house in the suburbs" ideal (basement, deck or patio, fireplace, swimming pool or hot tub, garage, yard or play area, landscaping). Although they shared concern about crime with the other groups of students, they spoke of living in secure buildings or equipping their homes with security devices rather than in terms of moving away from the city. In summary, although some West Side students

shared the Michigan students' vision of a big house in a suburban or semi-rural community, many if not a majority of them depicted well-appointed apartments or condos in New York or some other big city.

The Harlem students contrasted with those in the other two groups in several respects. First, fewer of them had anything to say about general features of the home beyond identifying specific rooms and "extras." Few of them even mentioned the size of the home, let alone its style or location (until probed specifically about the latter). The Harlem students were much more likely than other students to mention bathrooms in describing their ideal homes, probably because they had to share bathrooms with many more people than the other students did. The Harlem students also were less likely than other students to mention specific rooms beyond the most basic and common ones (bedrooms, kitchen, bathroom, dining room, living/family room). Concerning the location of their ideal home, Harlem students were less likely to mention proximity to relatives or friends (which we found surprising) or proximity to food stores and restaurants (which was not surprising given their location). Finally, although several of them mentioned wanting to live far away from crime, none of them mentioned living far away from urban density, traffic, noise, factories, junkyards, etc. Perhaps these students were less bothered by these facets of urban environments, or perhaps they did not yet appreciate the possibility of moving away from them when they grew up.

What the Students Would Like to Learn About Shelter

The last question invited the students to tell us what they would like to learn about homes if they were to be taught a unit on the topic. A few students were unable to respond

to this question, but most identified at least one specific thing that they would like to learn, and many identified several. The questions tended to focus on details of home construction (how homes in general or particular aspects of homes are built) and on issues raised in the interview, especially questions that the student had been unable to answer (e.g., about the functioning of or payment for utilities). The students' responses are listed below.

West Side:

1. How people make homes, how many people work on them, how they could build something as big as the Empire State Building (goes on to say when they built the twin towers to be bigger, they had to cut the Empire State Building down to size, and persists when the interviewer challenges it)
2. How they make different kinds of chemicals used in making a house
3. How they make heaters (and where the air comes out from); how good they are and how much they cost
4. What homes are made of, now and in the past
5. How they build homes, what they use, how they put in the floor, the ceiling, the light fixtures and the wires
6. How they get their electricity
7. How much you have to pay for a home
8. How homes are built
9. About the homes that rich people, poor people, and normal people live in; would like to go to a home and learn exactly what each pipe is and each electrical system
10. What they use to build homes, what goes in between the walls

11. About the way people live now and the way they lived in the past; who invented heat, electricity, and water

12. How they're built, how they put in elevators, how they make doorbells

13. About different homes in different countries, what they look like and what they are like inside

14. How they're built, why they have to be built in certain ways (like brownstones versus wood)

15. What homes were like a hundred years ago and what they will be like in space

16. How things look inside some homes and how the outsides look, because different countries they have different insides and outsides. Also, where they are set, like if they are set near a park or near museums and schools

17. About how long it takes to build one; how they put the floors and ceilings in; and if it is an apartment, if they put anything between your ceiling and the floor of the people that live above you.

Harlem:

1. How they make heating in homes, where the wood really comes from, how buildings get electricity

2. How they build them, why it takes so long, how they build electricity, why these don't look like concrete and when you pick a hole in it it has little tiny white things in it

3. How to build a home

4. How they make bricks; how they make rooms; how they make things real, real big; why they would build big buildings

5. How to build one, how the electricity goes, how they make the carpets and the beds, where they get the wood and stuff, how they make the basement down in the floor

6. How they make the inside, how they make the lights

7. How you pay for a house; how you get heat, water, and light; how to make them

8. How people build them, how they live in them, and what they look like

9. About homes in the past, how hard it was to build them and what happened to them, who built them. I know they built them out of seaweed and brick, but what else to keep them together, and how they dried so fast

10. How tall that one building is (in the picture), how much the building weighs, how many rooms are in it, how many people it takes to build it

11. About how they make them and how they work

12. How people get to make tall buildings and why other people make different kinds of buildings; how they get all the furniture

13. About tipis and houses made out of clay, about New York City buildings and houses that are south, how they make the doorknobs for the houses and the steel for the beds and stuff, how you make glass.

Michigan

1. About when and why you buy a home

2. Why we have to pay bills, how much homes cost, why there are chimneys, why trees hang over your roof

3. How they're built, how they help people

4. The homeless

5. How long it takes to build, how they make skylights

6. How they look, what utilities they use, what they're near
7. Why they build them
8. Who built the first home and when
9. How they build and paint and install appliances, electricity, sinks, and tile; the basement
10. How they work, where they build
11. How they make homes—carve it out, measure for doors and windows; how to repair and paint
12. How they're built, where you get them, homes around the world, why people don't make their own homes instead of buying them
13. Utility bills—who you pay and for what
14. How they're built, how electricity goes through the walls
15. Where water comes from before it goes into the rivers, why we use aluminum siding, how electricity is formed
16. How to build, what makes for quality, why builders choose such a hard job
17. How they build them and make money, where the supplies come from
18. How they make electricity, building materials other than bricks, how they make sure that the floor stays up
19. The use for homes
20. How they get and where they store electricity in homes
21. How long it takes to build, plumbing and getting faucets and stove to work, how the heater works

22. How homes are installed (insulated?) in warm vs. cold places, why igloos are warm inside
23. Why they build them, why they need bulldozers to tear them down instead of doing it by hand
24. Heating in the past—pioneers' bed warmers, etc.
25. How they make the walls thick, how they fix heaters
26. Utilities—who we pay, log cabins
27. Indian homes
28. Homes in the past
29. How they're built; bricks put together, siding put on; remodeling a house
30. Different materials used in different areas (according to dangers of earthquake, tornados, hurricanes, etc.)
31. How they are built and if they are layered, what's under the carpet, how they make chimneys
32. How they are built, insulation and keeping it from leaking water, roofing
33. Indian homes
34. Where the money we pay for it goes, how we get electricity, how they build it
35. How they're built, how they put in the piping
36. How they get logs to stay together and not fall down, how they get boards for the roof (talking about pioneer homes)
37. How they get windows in without breaking them
38. How they are built, homes in Africa

39. How they are built, how heat comes up, how long it takes to build different types of homes

40. Homes in the past and in the future

41. Homes in the past and in other places, buying vs. building your own home

42. How they build them, how long it takes

43. How they're built

44. How they're built

45. How to paint and how to sell a house

46. Indian homes—why the different types

47. How they're built and designed, who built them and when

48. How they're built, how long they last

49. How old they are, how are they built and at what costs to plants and animals, how sturdy and how long will they last

50. Answers to the questions asked in this interview

General Discussion

Given the progressions across the K-3 grade range observed in our initial study of primary-grade students' knowledge and thinking about shelter, the responses of the New York third graders interviewed for this follow-up study appear much more similar to than different from those of the Michigan third graders. The Harlem third graders generally knew less than the Michigan third graders, and the West Side third graders occasionally knew a little more. Where knowledge was lacking, certain misconceptions appeared with some frequency, but these usually did not include some of the more extreme

misconceptions observed in kindergarten and first grade students in the previous study. This discussion will focus primarily on the location differences that did appear. Readers interested in broader discussion of developments across Grades K-3 should consult the technical report for the initial study (Brophy & Alleman, 1999) or the subsequently published articles (Brophy & Alleman, 2000, 2001, in press a, in press b).

Statistically significant relationships with location were observed for 36% of the 235 categories shown in Table 1. This is a notably higher frequency than the five percent to be expected by chance, but also notably lower than the frequency of significant relationships with grade level observed in the initial study (66%).

Furthermore, the location differences are conflated with differences in the students' socioeconomic backgrounds. There was no tendency for the two New York groups to closely resemble each other and differ from the Michigan group. Instead, the West Side students responded similarly to the Michigan students in most respects, and these two groups contrasted with the Harlem students. A majority of the significant relationships with location appeared because of contrasts between the Harlem students and the students in the other two groups. Furthermore, most of these contrasts occurred because more of the West Side and Michigan students were coded for substantive responses to the questions but more of the Harlem students were coded for failing to respond or making only low-level responses. That is, the differences occurred because the Harlem students generally had less relevant knowledge to bring to bear in formulating responses to the questions, rather than because they responded in some qualitatively different way than the other two groups. Specifically, the Harlem students were less able to explain why people need homes, to supply the name "tipi" and suggest an explanation for why certain tribes used this form of

housing, to discuss the characteristics of log cabins, to say where the pioneers living in log cabins got their water, to explain why people prefer homes to apartments, to distinguish renting from buying, to explain home heating and lighting, to explain payments associated with keeping homes heated and lit, to identify general features of their ideal home, and to talk about things that they would like to avoid living near.

There were a few places where Harlem students responded differently from other students, usually in ways that are understandable given their socioeconomic backgrounds and geographic locations. They were more likely than students in the other groups to talk about paying rent or utility costs to "the super" (i.e., the building superintendent), mention a boiler or radiator when talking about heating, think that people do not have to pay for heating their living quarters, mention bathrooms in talking about features of their ideal homes, and describe relatively modest (and in some cases, even minimal) living quarters when describing their ideal homes.

The West Side students displayed more knowledge than students in the other two groups on a few items: They were the most likely to say that pueblo dwellers could not construct longhouses for lack of sufficient large trees, to say that pioneers had light from candles in their log cabins, to say that highrise buildings are built in order to get more out of the available space in large cities, and to offer an explanation of lighting that went beyond "blackbox" electricity theories. In addition, the West Side students occasionally reflected their generally rather privileged socioeconomic backgrounds: They identified more "other" rooms and extras in talking about their ideal homes and made more references to travel or to owning more than one residence.

The Michigan students' response patterns paralleled those of the West Side students for the most part, although they displayed more knowledge than both New York groups on a few items: They were more likely than other students to describe pueblos as more durable than longhouses, to identify freshwater sources when talking about how pioneers got their water, to say that most people prefer houses to apartments because you own the house and can decorate or equip it as you wish, to express the ownership concept clearly when distinguishing between renting and buying, to identify freshwater sources when asked where water for our homes comes from, to say that this water is piped to homes underground, and to say that we pay utility companies for our lighting. Some of these responses (particularly those dealing with freshwater sources) are attributable to their geographic location. This also applies to a few other places in the interview where the Michigan students made distinctive responses: They were more likely than other students to describe log cabins as small or cramped, to say that most people prefer houses to apartments, to think that people who do live in apartments must do so because they cannot afford a home, and to talk about forced air/furnace systems when discussing home heating. They also were less likely than the other students to suggest that some people prefer to live in apartments because they want to live close to others.

Achievement Level Differences

Analyses of relationships with location, achievement level, and gender were computed for the 235 categories shown in Table 1. These analyses indicated that significant relationships appeared 36% of the time for location, 19% of the time for achievement level, and 9% of the time for gender. Ten of the 44 significant relationships

with achievement level were nonlinear ones indicating that the average achievers were coded more (or less) often for the category than were the lower and higher achievers. We do not have any interpretations to offer for these nonlinear relationships (most of them were for "other" responses or for statements reflecting opinions rather than knowledge, so linear relationships with achievement level would not have been expected in any case). The 34 linear relationships with achievement level can be summarized simply by stating that, where linear relationships with achievement level appeared, the lower achievers were more likely to be unable to respond to the question or to generate a relatively unsophisticated response, whereas the higher achievers were more likely to generate a substantive response which was relatively sophisticated for the grade level. In short, there were no surprises or other noteworthy findings in the achievement level analyses.

Gender Differences

Gender differences appeared in only nine percent of the analyses, which is typical for our interviews. Given that 54 of the 89 students were from Michigan, the observed gender differences for the total sample were heavily influenced by those occurring in the Michigan subsample (Given the smaller numbers of students in the two New York samples and the fact that gender and achievement level were somewhat conflated rather than fully stratified within these samples, it did not make sense to attempt to analyze for gender differences within the three samples).

Most of the gender differences were on matters of preference or opinion rather than on items clearly indicative of differences in levels of knowledge about the topic. However, boys were more likely than girls to go beyond black-box responses in order to offer at least

partially correct explanations of electric lighting, whereas girls had more to say than boys about log cabins and about houses vs. apartments as living quarters. More boys than girls were unable to respond when asked to talk about log cabins generally and when asked to say how pioneers got their water, whereas more girls than boys described log cabins as small or cramped living quarters. More girls than boys indicated that many people prefer to live in apartments, and more specifically identified only needing a small living space as a reason for this.

Otherwise, more boys than girls gave protection against attacks as a rationale for why people need homes; gave not having to keep paying rent as a reason for why most people prefer houses to apartments; confused apartments with hotels; said that today we get heat from a fire or fireplace in addition to or instead of talking about modern heating systems; said that we do have to pay for heat but were unable to suggest whom we pay; and said that their ideal home would be located in a warm climate or near water. More girls than boys suggested that tipis were homes for poor or low status tribal members; suggested that most people prefer houses to apartments because houses afford more privacy; gave high demand for housing as an explanation for the construction of highrise apartment buildings in cities (but were no more likely than boys to talk about getting more out of the space available); talked about the colors of their ideal home or said that it would include a pool or hot tub; and suggested that the ideal home would be located near the children's school. Most of these differences are unsurprising given what is known about gender role socialization and gender differences in interests. Overall, however, the responses of the boys and the girls were much more similar than different.

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Appendix 1

Shelter Interview

1. DO PEOPLE LIVE IN HOMES JUST BECAUSE THEY WANT TO, OR DO THEY NEED HOMES? . . . WHY? . . . ARE THERE OTHER REASONS WHY THEY NEED HOMES?

(Continue probing until the student cannot think of more reasons why people need homes.)

2. WHAT ABOUT IN PLACES LIKE HAWAII WHERE IT'S WARM ALL YEAR ROUND? D(PEOPLE STILL NEED HOMES THERE? . . . WHY? . . . ARE THERE OTHER REASONS WHY PEOPLE STILL NEED HOMES EVEN IN WARM PLACES?

This question is meant primarily as a follow up for students who answered Question #1 by saying that people need homes to protect them from the cold. However, it sometimes also yields other reasons for needing homes beyond those mentioned in responses to Question #1.

If student says that people do not need homes in Hawaii, ask if the people down there live in homes even if they don't need them. When children say that they don't know, ask "IF YOU LIVED IN HAWAII, WOULD YOU WANT TO LIVE IN A HOME? WHY?"

In general, if students say that people in Hawaii don't live in homes or that they themselves would not choose to live in homes if they lived in Hawaii, cease probing and move on. However, when children say that people in Hawaii (or the children themselves if they lived there) prefer to live in homes even though they don't absolutely need to, probe to determine why. This will elicit the children's ideas about why people want to live in homes or what functions homes serve for them.

3. (Show drawing of longhouse and photo of pueblo). HERE ARE TWO KINDS OF HOMES THAT DIFFERENT GROUPS OF INDIANS LIVED IN A LONG TIME AGO. WHYDO YOU THINK THAT SOME INDIANS LIVED IN THIS KIND OF HOME BUT OTHERS LIVED IN THIS KIND OF HOME?

This question is designed to determine whether the children understand that in the past, people had to rely on whatever potential construction materials were readily available in the local area. Therefore, probe for substantive reasons that might explain why the different tribes built the different kinds of homes shown.

When children say only that the tribe built a particular type of home "because they wanted to" or "because they liked it," probe for more substantive reasons: DID THEY HAVE SOME OTHER REASON FOR BUILDING THIS KIND OF HOME BESIDES THAT THEY LIKED IT?

If other questioning and probing have not yielded any reasons connected with local availability of building materials, point to the pueblo and ask: THE INDIANS WHO BUILT THESE HOMES--COULD THEY HAVE BUILT THESE HOMES INSTEAD? (now pointing to the longhouse).

4. (Show photo of tipi). SOME OTHER INDIANS LIVED IN THIS KIND OF HOME. DO YOU KNOW WHAT IT WAS CALLED? . . . (Elicit, or if necessary, give the name "tipi") WHY DO YOU THINK THAT THESE INDIANS LIVED IN TIPIS INSTEAD OF OTHER KINDS OF HOMES?

This question is intended to see if the children understand that the Plains Indians were nomadic and therefore needed homes that were portable--easily taken down, transported, and reassembled. Therefore, keep probing if children merely say that the Indians "liked" tipis or if they give responses that do not include the portability notion (e.g., that they had a lot of animal hides and needed something to do with them). So long as the children keep producing reasons, ask variations of the question: ARE THERE OTHER REASONS WHY THESE INDIANS LIVED IN TIPIS?

5. (Show drawing of cabin) TWO HUNDRED YEARS AGO, THE PIONEERS LIVED IN LOG CABINS. WHAT WERE THOSE LOG CABINS LIKE BACK THEN? . . . HOW WERE THEY DIFFERENT FROM TODAY'S HOMES?

Questions *5-8* are a set asking for comparisons of features of homes and everyday living in the pioneer days versus today. Begin with the first part of Question #*5* and encourage the children to tell whatever they know about log cabins. After they complete their initial statements, ask the second question about how log cabins were different from today's homes. Once again, encourage children to keep mentioning differences as long as they are able to do so.

Questions 6-8 are follow-ups designed to get at particular aspects of life in the pioneer days. When children completely cover one of these questions in the process of answering Question *5*, you can omit answering the follow-up question. However, if children merely allude to the feature of everyday living covered in one of the follow-up questions or do not cover the issue addressed in the question completely, ask them to elaborate on what they said earlier by responding to Questions 6-8.

6. HOW DID PEOPLE WHO LIVED IN LOG CABINS GET THEIR WATER?

This question is intended to determine whether students realize that pioneers did not have running water and thus had to fetch water from a well or a nearby stream. When initial responses are unclear about this issue, probe by using some variation of "Tell me more about that."

When children appear not to understand the point of the question or are unable to respond at all, probe by asking: WHEN THOSE PIONEERS WERE LIVING IN THOSE CABINS BACK THEN AND THEY DECIDED THEY WANTED A DRINK OF WATER, WHAT WOULD THEY DO?

7. HOW DID THEY HEAT UP THEIR CABINS?

This question is intended to determine whether students realize that pioneers depended on fireplaces for heat and did not have modern heating systems. Again, if the initial response is vague or ambiguous, use "tell us more about that" probes.

8. WHAT ABOUT LIGHT? AFTER IT WAS DARK, DID THEY HAVE LIGHT IN THEIR CABINS?

This question is intended to determine whether the students understand that the pioneers did not have electric lights and thus had to depend on light from the fire or from candles or oil lamps. Again, use "tell me more about that" probes if initial responses are vague.

9. LET'S TALK ABOUT THE HOMES THAT PEOPLE LIVE IN TODAY. SOME FAMILIES LIVE IN HOUSES AND SOME LIVE IN APARTMENT BUILDINGS. DO YOU THINK THAT MOST PEOPLE WOULD RATHER LIVE IN A HOUSE OR IN AN APARTMENT? WHY?

Questions 9-12 are a set that address students' thinking about the relative advantages of living in a house versus an apartment. When children understand the initial question and choose one of the alternative responses (most will say they would rather live in a house), accept the response and then ask why, continuing to probe for reasons so long as the child continues to supply them. Then go to Question 10, choosing either the first or the second version depending on how the child responded to Question 9.

When children seem unclear about Question 9, it may be because they do not know what "apartment" means. Here, you may need to rephrase the question as follows:

SOME FAMILIES LIVE BY THEMSELVES IN THEIR OWN HOUSES, BUT SOME LIVE IN BIGGER APARTMENT BUILDINGS WHERE OTHER FAMILIES LIVE TOO. DO YOU THINK THAT MOST PEOPLE WOULD RATHER LIVE IN A HOUSE OR IN AN APARTMENT? . . . WHY?

10A. (If child says most people would rather live in a house) IF MOST PEOPLE WOULD RATHER LIVE IN HOUSES, WHY DO SO MANY PEOPLE LIVE IN APARTMENTS?

10B (If child says most people would rather live in an apartment) IF MOST PEOPLE WOULD RATHER LIVE IN APARTMENTS, WHY DO SO MANY PEOPLE LIVE IN HOUSES?

Questions 10 and 11 follow up on Question 9 by probing the students' thinking about the relative advantages of houses versus apartments. Most students will respond to Question 9 by suggesting that houses are more desirable (because they are bigger, have yards or garages, etc.), so for Question 10 you will be asking them why so many people live in apartments if most would rather live in houses. Most of these students will say that people who live in apartments don't yet have enough money to buy a house, so they are waiting until they do. With these students, you will follow up by asking Question 11.

Some students may answer Question 9 by suggesting that most people would rather live in an apartment than in a house, and giving reasons. For these students, Question 10 will ask them why so many people live in houses if most would rather live in apartments. These students will not be asked Question 11, unless in the process of responding to probing they change their response to the more typical one.

11. (If appropriate) SOME PEOPLE COULD AFFORD TO BUY A HOUSE BUT THEY WOULD RATHER LIVE IN AN APARTMENT. WHY DO YOU THINK THEY WANT AN APARTMENT?

This question is only for students who have said that most if not all people who live in apartments do so only because they do not have the money to purchase a house. Question 11 is intended to see if these students can think of any other reasons why people might live in an apartment, especially reasons why they might prefer an apartment to a house.

Question 11 will not be asked if students have said that most people prefer apartments to houses. It also will not be asked if students discuss various trade-offs in houses versus apartments but do not communicate the idea that most people currently living in apartments would rather live in houses but lack the money to buy them.

12. DO YOU LIVE IN A HOUSE, AN APARTMENT, A TRAILER HOME, OR WHAT?

(If the child lives in a house or apartment, go directly to the next question. However, if the child lives in a trailer, a mobile home, or something other than a house or apartment, probe for comparison with living in a house, using questions such as the following).

HOW DO YOU LIKE LIVING IN A trailer home)?

WOULD YOU RATHER LIVE IN A (trailer home) OR IN A REGULAR HOUSE?

DO YOU THINK THAT SOME PEOPLE WOULD RATHER LIVE IN (the child's non-preferred choice) . . . WHY?

13. IN SMALL TOWNS, MOST PEOPLE LIVE IN HOUSES OR SMALL APARTMENT BUILDINGS. BUT IN BIG CITIES, MANY PEOPLE LIVE IN VERY TALL APARTMENT BUILDINGS, LIKE THIS ONE (show photo). WHY DO YOU THINK THEY HAVE SO MANY BIG, TALL APARTMENT BUILDINGS IN BIG CITIES?

This question is intended to see if the students understand that high demand on limited space creates a tendency to build upwards as well as outwards in big cities, or alternatively, to see if they realize that continuous building of houses would place people further and further away from the city. Probe persistently enough to determine if children have these concepts. If necessary, probe for elaboration using "tell me more about that" probes.

(If child says because there are so many people in cities: WELL, WHY DON'T THEY JUST BUILD MORE HOUSES INSTEAD OF BUILDING THOSE BIG APARTMENT BUILDINGS?)

14. THE PEOPLE WHO LIVE IN APARTMENT BUILDINGS--DO THEY HAVE TO PAY MONEY TO LIVE THERE? . . . WHO DO THEY PAY? . . . WHY DO THEY HAVE TO PAY?

Questions 14-16 concern the economics of housing rental and purchase. Question

14 is intended to determine if students realize that people must pay to live in apartment buildings (almost all of them will realize this). If the students speak of going to an office or some other place to pay, but do not mention the person that the money is paid to, probe for this (e.g., "When they get to the office, who do they pay?"). We are interested in whether the students realize that the people that collect rent in very large apartment buildings usually are not the owners.

15. SOME PEOPLE RENT A PLACE TO LIVE, AND SOME PEOPLE BUY ONE. WHAT'S THE DIFFERENCE BETWEEN RENTING AND BUYING?

If children appear confused and unable to answer the question, try breaking it into two separate parts (e.g., "What does it mean to rent a place to live? . . . What does it mean to buy a place to live?").

16. CAN A FAMILY BUY A PLACE TO LIVE AND MOVE INTO IT EVEN IF THEY HAVE ONLY PART OF THE MONEY THEY NEED TO PAY FOR IT? . .. HOW DOES THAT WORK?

This question is intended to see if students know anything about mortgages (i.e., the idea that a family can borrow money from a bank, use it to buy a house, and then pay the bank back over a number of years). Probe according to the child's initial responses.

If the child doesn't know about mortgage loans and says that people have to save up until they have the full price, go on to Question 17.

When students speak of the family borrowing from relatives or friends, probe for knowledge about loans from banks, but without mentioning the banks directly (e.g., "What if their relatives couldn't lend them the money, is there some other way that they could buy the house?").

When students say something about getting a loan or money from a bank, probe for details (in particular, to see if they know that you get all the money you need now but pay it back slowly over several years).

Finally, for those children who do express basically correct ideas about mortgage loans, probe to see if they understand the bank's profit motive for making these loans available (e.g., "Why are banks willing to give families money to buy houses, and then have the families pay them back later?"). If the children suggest reasons other than the profit motive (e.g., the banks want to help people), ask "Are there any other reasons why banks are willing to give people money and then let them pay it back later?"

17. INSIDE OUR HOMES, WE USE WATER WHEN WE TURN ON OUR FAUCETS. WHERE DOES THAT WATER COME FROM? (If child says from pipes under the sink, keep probing for original source of water, e.g., OK, BUT WHERE IS THE WATER A PIPED IN FROM?)

This question is intended to determine if students understand that water is piped into their homes from some external source, and if so, what they know about where the water comes from and how the process works.

If children say that the water comes from a well, probe for more information and try

to determine if these responses are based on the children's knowledge of how things work at their own homes. If it appears that the child's home has its own well, probe for knowledge about homes connected to municipal water systems (e.g., "What about houses that don't have their own wells--where does their water come from?").

18. OUR HOMES ARE HEATED WHEN THE WEATHER IS COLD. WHERE DOES THAT HEAT COME FROM?

(If necessary, probe to see if child understands concept of central heating--water or air heated in a boiler or furnace, then circulated around the house. Individualize your probing as follows.)

(If child says heat comes from furnace): HOW DOES THAT HEAT GET FROM THE FURNACE TO THE DIFFERENT ROOMS IN THE HOUSE? (If child says the heat comes from register): OK, YOU CAN FEEL WARM AIR BLOWING OUT, BUT WHERE DOES THAT WARM AIR COME FROM? IS THERE SOMETHING THAT MAKES THE HEAT?

(If it is clear that the child's home is heated with dispersed electrical heaters, portable space heaters, or something other than a central heating system, probe for knowledge of the heating system at school.) HERE AT SCHOOL WE HAVE WARM AIR BLOWING INTO THE ROOM WHEN THE HEAT COMES ON [show heat register in the interview room]. WHERE DOES THAT HEAT COME FROM?

... WHAT MAKES THE HEAT?

19. WHEN WE USE HEAT IN OUR HOMES, DO WE HAVE TO PAY FOR IT? ... WHO DO WE PAY? . . . WHY DO WE HAVE TO PAY?

This question is intended to see if children understand that we burn fuel and/or use electricity when we heat our homes, and therefore we have to pay (either directly by purchasing fuel or indirectly by paying utility companies for the gas or electricity we use).

If the child is able to respond to the last question about why we have to pay, probe to see if the child can say something about consuming fuel, energy, or electricity.

20. FAMILIES LIGHT UP THEIR HOMES BY TURNING ON LAMPS OR LIGHTS. HOW DOES THAT WORK?

This question is intended to see if students know anything about how electric lights work. If they do, they will say something about how plugging in or turning on a light brings electricity to it and makes it light up. Some students will know that electricity is needed but will not offer any explanations beyond this. Probe these students by asking, WHAT HAPPENS WHEN WE TURN ON THE SWITCH?

21. DO FAMILIES HAVE TO PAY FOR THE LIGHTING IN THEIR HOMES? ... WHO DO WE PAY? . . . WHY DO WE HAVE TO PAY?

This question is intended to see if students understand that we use electricity when we turn on our lights and we have to pay for whatever electricity we use. Many children understand that their parents purchase light bulbs but do not understand that they also pay for electricity used when running the lights after they get them

home. Be prepared to follow up with a probe to see if the child also understands that we must pay for the electricity we use when we turn our lights on: OK, WE BUY LIGHT BULBS AND THEN BRING THEM HOME TO USE THEM IN OUR LAMPS. DO WE ALSO HAVE TO PAY FOR USING THEM--DOES IT COST US TO TURN OUR LAMPS ON AND LEAVE THEM ON?)

22. WHEN YOU'RE GROWN UP AND HAVE A FAMILY OF YOUR OWN, YOU MIGHT WANT TO BUY A PLACE TO LIVE. WHAT KIND OF PLACE WOULD YOU LOOK FOR? . . . (If necessary, ask: WOULD YOU WANT THE HOME TO HAVE ANY SPECIAL ROOMS?)

This set of questions provides students with opportunities to think about the kinds of homes they might want when they are adults. Question 22 opens this topic in a general way. Keep probing (e.g., "Anything else about the home you would be looking for?") so long as the child is able to continue generating criteria. If children shift focus from listing features of the house to listing things they would have in the house (video games, etc.), refocus them on the house.

23. IS THERE ANYTHING UNUSUAL OR SPECIAL ABOUT THE HOME YOU WOULD WANT?

24. WHAT ABOUT LOCATION OF THE HOME--WOULD YOU WANT TO LIVE NEAR CERTAIN THINGS? . . . WOULD YOU WANT TO LIVE FAR AWAY FROM CERTAIN THINGS?

This question is intended to see if the children realize that families consider not only the qualities of the house itself but where it is located with reference to jobs, schools, etc.

25. SUPPOSE THAT NEXT WEEK YOUR TEACHER WAS GOING TO TEACH YOU ABOUT HOMES, HOMES THAT PEOPLE LIVE IN HERE AND IN OTHER PARTS OF THE WORLD, AND WHAT HOMES WERE LIKE IN THE PAST. IF YOU WERE GOING TO LEARN ABOUT HOMES, WHAT WOULD YOU LIKE TO LEARN? ... WHAT ELSE? . . IS THERE ANYTHING ELSE YOU WOULD LIKE TO LEARN ABOUT HOMES?

(We are not looking for anything in particular with this question, so just encourage the students to keep responding until they indicate that they can't think of anything else.)

Table 1. Relationships of Coding Categories to School Locations[1]

	Frequencies					Percentages			
	Total Sample	NY West	NY Harlem	Mich	Probability	Total Sample	NY West	NY Harlem	Mich
Number of Students	**89**	**18**	**17**	**54**		**100**	**100**	**100**	**100**
1A. Do people live in homes just because they want to, or do they need homes?									
0. No (people don't need homes)	0	0	0	0		0	0	0	0
1. Don't know/other (any response that is not clearly yes or no)	0	0	0	0		0	0	0	0
2. Yes (people need homes)	89	18	17	54		100	100	100	100
1B. Why do people need homes?									
0. Neither a protection nor homebase rationale	3	0	1	2		3	0	6	4
1. Protection rationale only	19	3	1	15		21	17	6	28
2. Homebase rationale only	12	1	6	5	.01	13	6	35	9
3. Both protection and homebase rationales	55	14	9	32		62	78	53	59

Table 1 (cont'd.)

2A. What about places like Hawaii where it's warm all year round? Do people still need homes?

0. No (people don't need homes in Hawaii)	0	0	0	0		0	0	0	0
1. Don't know	0	0	0	0		0	0	0	0
2. Yes (people do need homes even in Hawaii	84	17	15	52		94	100	88	96
3. Other/mixed	5	1	2	2		6	6	12	4

2B. Why do people still need homes even in warm places?

0. Neither a protection nor a homebase rationale	1	0	0	1		1	0	0	2
1. Protection rationale only	30	3	3	24	.02	34	17	18	44
2. Homebase rationale only	18	4	8	6	.01	20	22	47	11
3. Includes both protection and homebase rationale	40	11	6	23		45	61	35	43

2C. If you lived in Hawaii, would you want to live in a home? Why?

0. Don't know/no relevant response	0	0	0	0		0	0	0	0
1. Protection: unspecified	1	0	1	0		1	0	6	0

Table 1 (cont'd.)

2.. Protection against rain	41	9	2	30	.01	46	50	12	56
3. Protection against cold, snow, or unspecified bad weather	62	14	11	37		70	78	65	69
4. Protection against sun or heat	34	8	2	24	.05	38	44	12	44
5. Protection against fury of nature	26	4	1	21	.03	29	22	6	39
6. Protection against attacks	10	3	1	6		11	17	6	11
7. Homebase: meet needs	69	14	16	39		78	78	94	72
8. Homebase: store possessions	27	8	1	18	.03	30	44	6	33
9. Other	8	2	2	4		9	11	12	7
2D. Overall categorization of response to Questions 1 and 2									
0. No explanation of need for houses in Hawaii	2	0	1	1		2	0	6	2
1. "Reaches" to explain need for houses in Hawaii	3	1	0	2		3	6	0	4
2. Shifts from cold/winter to other rationale	9	2	0	7		10	11	0	13

Table 1 (cont'd.)

3. Not limited to cold/ winter rationale on Question 1	75	15	16	44		84	83	94	81

3A. Here are two kinds of homes that different groups of Indians lived in a long time ago. Why do you think that some Indians lived in this kind of home (longhouse) but others lived in this kind of home (pueblo)?

0. Don't know/no relevant response	18	2	8	8	.01	20	11	47	15
1. Presumed personal or cultural preferences	4	1	2	1		4	6	12	2
2. Pueblo more durable	28	1	2	25	.01	31	6	12	46
3. One type of house was bigger, fit more people, belongings	20	1	1	18	.01	22	6	6	33
4. Lack of construction materials	18	6	1	11		20	33	6	20
5. Lack of construction knowledge	8	1	2	5		9	6	12	9
6. Other	24	7	1	16	.07	27	39	6	30

Question 3B. The Indians who built these homes (pueblos)—could they have built these homes instead (longhouses)?

0. Confused/unsure	50	6	7	37	.01	56	33	41	69
1. No explanation	12	3	6	3	.01	13	17	35	6

Table 1 (cont'd.)

2. Knowledge problem (didn't know how to build them)	6	0	1	5		7	0	6	9
3. Materials problem (didn't have materials)	23	9	3	11	.03	26	50	18	20
4A. Some other Indians lived in this kind of home. Do you know what it was called?									
0. Don't know/no relevant response	11	2	7	2	.01	12	11	41	4
1. All but tipi (tent, wigwam, other)	13	2	8	3	.01	15	11	47	6
2. Tipi	65	14	2	49	.01	73	78	12	91
4B. Why do you think that these Indians lived in tipis instead of other kinds of homes?									
0. Don't know/no relevant response	10	0	5	5	.02	11	0	29	9
1. Unspecified personal or cultural beliefs	6	1	1	4		7	6	6	7
2. Specified personal or cultural beliefs	35	8	3	24		39	44	18	44
3. Lack of construction materials or knowledge	26	7	5	14		29	39	29	26
4. Poverty or low status	3	1	2	0	.05	3	6	12	0

Table 1 (cont'd.)

5	Portability without explanation	6	1	0	5		7	6	0	9
6.	Portability with explanation	3	1	0	2		3	6	0	4
7.	Other	18	4	1	3		20	22	6	6

5. Two hundred years ago, the pioneers lived in log cabins. What were those log cabins like back then? How were they different from today's homes?

0.	Doesn't know/restates the obvious	9	0	8	1	.01	10	0	47	2
1.	People had to construct the cabin themselves	16	1	2	13		18	6	12	24
2.	Smaller than our homes, cramped quarters, just one or two rooms	33	4	0	29	.01	37	22	0	54
3.	Primitive, make-shift beds and furniture, not much furniture	15	2	2	11		17	11	12	20
4.	No paint or color, no wallpaper	5	1	0	4		6	6	0	7
5.	No siding, crude insulation, drafty, roof or walls leak when it rains	20	7	1	12	.06	22	39	6	22

Table 1 (cont'd.)

6. Primitive doors or windows (or none at all)	23	6	0	17	.03	26	33	0	31
7. No oven—had to cook in fireplace	10	2	2	6		11	11	12	11
8. No electricity or modern plumbing	24	4	0	20	.01	27	22	0	37
9. Other	45	10	4	31	.05	51	56	24	57
6. How did they get their water?									
0. Doesn't know/no relevant response	3	1	2	0	.05	3	6	12	0
1. Faucets, sinks, toilets, drinking fountains	2	0	1	1		2	0	6	2
2. Lakes, streams, rivers, waterfalls (fresh water sources)	74	13	12	49	.06	83	72	71	91
3. Wells, pump from the ground	26	8	1	17	.04	29	44	6	31
4. Ocean, sea (salt water sources)	2	0	2	0	.01	2	0	12	0
5. Other	2	0	0	2		2	0	0	4

Table 1 (cont'd.)

7. How did they heat up their cabins?

0. Doesn't know/no relevant response	2	0	1	1		2	0	6	2
1. Modern gas or electric heating	0	0	0	0		0	0	0	0
2. Warm clothes, blankets, shutters, insulation, close doors or windows	6	1	0	5		7	6	0	9
3. Candle, lantern	2	2	0	0	.02	2	11	0	0
4. Fire, fireplace, wood-burning stove	82	17	15	50		92	94	88	93
5. Other	2	0	1	1		2	0	6	2

8. What about light? After it was dark, did they have light in the cabin?

0. Doesn't know/no relevant response	0	0	0	0		0	0	0	0
1. Electric light, flash-lights, light from TV	2	0	1	1		2	0	6	2
2. Only moonlight	8	0	1	7		9	0	6	13
3. Fire, fireplace (light from the fire), torches	37	4	8	25		42	22	44	46
4. Candles, matches	50	14	7	29	.08	56	78	41	54

Table 1 (cont'd.)

5. Oil lamps, lanterns	25	4	2	19		28	22	12	35
6. Other	1	0	1	0		1	0	6	0

9A. Let's talk about the homes that people live in today. Some families live in houses, and some live in apartment buildings. Do you think that most people would rather live in a house or in an apartment?

0. Doesn't know/can't choose	10	6	3	1	.01	11	33	18	2
1. Most prefer an apartment	12	5	6	1	.01	13	28	35	2
2. Most prefer a house	67	7	8	52	.01	75	39	47	96

9B. Why do most people prefer houses to apartments?

0. Doesn't know/no relevant response	5	1	4	0	.01	6	6	24	0
1. Houses are bigger, afford more space or rooms	51	11	2	23	.01	57	61	12	70
2. Houses afford privacy	32	9	6	17		36	50	35	31
3. Houses are yours to use, equip, decorate as you wish	27	1	3	23	.01	30	6	18	43
4. Houses afford easy entry and exit from the street	14	2	2	10		16	11	12	19

Table 1 (cont'd.)

5. Houses offer features that you don't get in apartments	25	7	3	15		28	39	18	28
6. You don't have to keep paying (rent) for houses	4	0	0	4		4	0	0	7
7. Houses are nicer looking or prettier	0	0	0	0		0	0	0	0
8. In a house you can have a second floor and/or a basement	7	3	0	4		8	17	0	7
9. Other	21	3	2	16		24	17	12	30
10. If most people would rather live in houses, why do so many people live in apartments?									
0. Not relevant to this student	31	12	9	10	.01	35	67	53	19
1. Doesn't know/no relevant response	1	0	0	1		1	0	0	2
2. Can't afford a house	50	6	4	40	.01	56	33	24	74
3. Waiting for house availability	9	1	2	6		10	6	12	11
4. Other	3	0	3	0	.01	3	0	18	0

Table 1 (cont'd.)

11. Some people could afford to buy a home but they would rather live in an apartment. Why do you think they would want an apartment?

0. Doesn't know/no relevant response	15	1	3	11		17	6	18	20
1. They want to use their money for something other than housing	18	2	2	14		20	11	12	26
2. They only need a place for a short time	0	0	0	0		0	0	0	0
3. They only need or want a small space	17	3	0	14	.06	19	17	0	26
4. They don't want the work of keeping up a house	8	2	2	4		9	11	12	7
5. They want to live close to others	22	8	6	8	.02	25	44	35	15
6. Other valid reasons	45	11	7	27		51	61	41	50
7. Confuses apartments with hotels	3	0	0	3		3	0	0	6
8. Confuses apartments with office buildings	0	0	0	0		0	0	0	0

12. Do you live in a house, an apartment, a trailer home, or what?

0. Doesn't know/no clear response	0	0	0	0		0	0	0	0

Table 1 (cont'd.)

1. House	41	0	1	40	.01	46	0	6	74
2. Apartment	42	18	16	8	.01	78	100	94	15
3. Trailer home, mobile home, etc.	5	0	0	5		6	0	0	9
4. Other (duplex, townhouse, etc.)	1	0	0	1		1	0	0	2
13. Why do you think they have so many big, tall apartment buildings in big cities?									
0. Don't know/no relevant response	12	4	4	4		13	22	24	7
1. Demand for housing	53	9	10	34		60	50	59	63
2. Convenience	6	1	1	4		7	6	6	7
3. Builders' profits	4	1	0	3		4	6	0	6
4. Getting more out of the available space	22	10	1	11	.01	25	56	6	20
5. Other relevant response	39	4	6	29	.05	44	22	35	54
14A. The people who live in apartment buildings—do they have to pay money to live there?									
0. Doesn't know/no relevant response	0	0	0	0		0	0	0	0
1. No or probably not	1	0	1	0		1	0	6	0

Table 1 (cont'd.)

2. Yes or thinks that they do	88	18	16	54		99	100	94	100
14B. Whom do they pay?									
0. Doesn't know/no relevant response	10	5	2	3	.04	11	28	12	6
1. The owner	44	9	4	31	.05	49	50	24	57
2. The apartment manager	22	4	3	15		25	22	18	28
3. A hotel clerk	0	0	0	0		0	0	0	0
4. Other relevant response	19	6	8	5	.01	21	33	47	9
14C. Why do they have to pay?									
0. You don't have to pay	1	0	1	0		1	0	6	0
1. Fact of life	56	9	11	36		63	50	65	67
2. Owner reimbursement or profit	24	7	3	15		27	39	18	26
3. Other relevant response	8	2	2	4		9	11	12	7
15. Some people rent a place to live and some people buy one. What's the difference between renting and buying?									
0. Doesn't know/no relevant response	11	2	5	4	.05	12	11	29	7

Table 1 (cont'd.)

1. Focuses only on time dimension	12	6	6	0	.05	13	33	35	0
2. Explicitly states ownership concept	66	10	6	50	.01	74	56	35	93
16. Can a family buy a place to live and move into it even if they have only part of the money needed to pay for it?									
0. Doesn't know/no relevant response	1	1	0	0		1	6	0	0
1. No	44	7	10	27		49	39	59	50
2. Only if the owner agrees	9	4	2	3		10	22	12	6
3. Thinks so but can't explain	28	4	5	19		31	22	29	35
4. Yes, by getting a mortgage loan	7	2	0	5		8	11	0	9
5 Other relevant response	0	0	0	0		0	0	0	0
17A. Inside our homes, we use water when we turn on our faucets. Where does that water come from?									
0. Doesn't know/no relevant response	10	3	3	4		11	17	18	7
1. Mentions salt water sources	18	2	5	11		20	11	29	20
2. Mentions only fresh water sources	47	6	7	34	.05	53	33	41	63

Table 1 (cont'd.)

3. Other relevant response	16	7	4	5	.01	18	39	24	9

17B. What happens to the water before it is sent to our homes?

0. Doesn't know/no relevant response	10	4	4	2	.02	11	22	24	4
1. Water is piped into the house through underground pipes	74	12	11	51	.01	83	67	65	94
2. Water is purified before being sent	36	7	6	23		40	39	35	43
3. Water goes to a water tower after being purified	9	2	0	7		10	11	0	13
4. Other relevant response	3	3	0	0	.01	3	17	0	0

18A. Our homes are heated when the weather is cold. Where does that heat come from?

0. Doesn't know/no relevant response	5	2	1	2		6	11	6	4
1. The sun	11	1	4	6		12	6	24	11
2. The heat/power company	11	1	0	10	.08	12	6	0	19
3. Electricity	4	4	0	0	.01	4	22	0	0
4. Boiler/radiator	11	2	9	0	.01	12	11	53	0

Table 1 (cont'd.)

5. Fire or fireplace	7	1	1	5		8	6	6	9
6. Heat register	16	0	0	16	.01	18	0	0	30
7. Heater or furnace	24	4	4	16		27	22	24	30
8. Forced air from furnace	32	5	2	25	.03	36	28	12	46
9. Other relevant response	9	4	4	1	.01	10	22	24	2
18B. How is the heat produced?									
0. Doesn't know/no relevant response	12	2	6	4	.01	13	11	35	7
1. Electricity is inherently hot and thus heats	3	2	1	0	.06	3	11	6	0
2. Power company sends heat	11	2	0	9		12	11	0	17
3. Black box furnace, heater, or boiler theory	45	9	8	28		51	50	47	52
4. Firebox theory	16	3	1	12		18	17	6	22
5. Other relevant response	3	0	1	2		3	0	6	4
19. Do we have to pay for that heat?									
0. Doesn't know/no relevant response	6	2	3	1	.05	7	11	18	2

Table 1 (cont'd.)

1. We don't have to pay	17	3	10	4	.01	19	17	59	7
2. Says that we do have to pay but can't say who or for what	5	2	0	3		6	11	0	6
3. We pay people who fix our heater, furnace, etc.	2	1	0	1		2	6	0	2
4. We pay a government agent or agency	18	6	0	12	.05	20	33	0	22
5. We pay a bank	1	0	0	1		1	0	0	2
6. We pay a utility company	29	6	1	22	.03	33	33	6	41
7. Other relevant response	16	1	4	11		18	6	24	20

20. Families light up their homes by turning on lamps or lights. How does that work?

0. Doesn't know/no relevant response	5	1	3	1	.05	6	6	18	2
1. Electricity as black box	71	14	11	46		80	78	65	85
2. Incorrect or partial answer	9	1	3	5		10	6	18	9
3. Accurate explanation	2	2	0	0	.02	2	11	0	0
4. Other relevant response	6	0	0	6		7	0	0	11

Table 1 (cont'd.)

21. Do families have to pay for the lighting in their homes?

0. Doesn't know/no relevant response	2	2	0	0	.02	2	11	0	0
1. We don't have to pay	2	1	0	1		2	6	0	6
2. Says that we do have to pay but can't say who or for what	2	1	0	1		2	6	0	6
3. We have to buy bulbs, but we don't have to pay for using them	3	0	2	1		3	0	12	6
4. We have to pay the people who give/send us light	8	3	5	0	.01	9	17	29	0
5. We have to pay the utility company for the electricity we use	50	8	5	37	.01	56	44	29	69
6. Other relevant response	23	3	6	14		26	17	35	26

22. When you're grown up and have a family of your own, you might want to buy a place to live. What kind of place would you look for?
23. Is there anything unusual or special about the home you would want?

22/23A. What rooms did the student mention?

0. None/no relevant response	25	2	5	18		28	11	29	33
1. Living/family room	29	8	4	17		33	44	22	31

Table 1 (cont'd.)

2. Dining room	15	1	3	11		17	6	18	20
3. Bedrooms	45	10	7	28		51	56	41	52
4. Kitchen	26	5	5	16		29	28	29	30
5. Laundry room	3	1	0	2		3	6	0	4
6. Bathrooms	29	5	11	13	.01	33	28	65	24
7. Playroom	14	2	2	10		16	11	12	19
8. Guest room	5	1	0	4		6	6	0	7
9. Other rooms (storage, office, library, display room, etc.)	17	7	2	8	.06	19	39	12	15
22/23B. Extras mentioned (besides conventional rooms)									
0. None/no relevant response	44	7	9	28		49	39	53	52
1. Basement	13	0	4	9		15	0	24	17
2. Porch/deck/ patio	6	0	1	5		7	0	6	9
3. Fireplace	4	1	0	3		4	6	0	6
4. Swimming pool/hot tub/Jacuzzi	9	0	1	8		10	0	6	15
5. Garage	2	0	1	1		2	0	6	2

Table 1 (cont'd.)

6. Yard/outside play area	10	2	1	7		11	11	6	13
7. Landscaping	4	0	0	4		4	0	0	4
8. Other	18	8	4	6	.01	20	44	24	11
22/23C. General features of the home (beyond rooms and extras already coded)									
0. None/no relevant response	23	3	11	9	.01	26	17	65	17
1. Size (big, or at least big enough for the family)	38	9	3	26	.07	43	50	18	48
2. Style (two storey, ranch, etc.)	17	3	2	12		19	17	12	22
3. Color or colors	7	1	1	5		8	6	6	9
4. Affordable	0	0	0	0		0	0	0	0
5. Location in a suburb or semi-rural area	11	3	0	8		12	17	0	15
6. Location in a warm climate	3	3	0	0	.01	3	17	0	0
7. Other (on a hill, near water, etc.)	19	2	2	15		21	11	12	28

Table 1 (cont'd.)

24A. What about location of the home—would you want to live near certain things?

0. None/no relevant response	14	4	4	6		16	22	24	11
1. Relatives or friends	18	3	0	15	.04	20	17	0	28
2. Water (lake, pond, river, beach)	7	1	1	5		8	6	6	9
3. Woods	14	3	1	10		16	17	6	19
4. Food stores (including fast food outlets)	15	2	0	13	.05	17	11	0	24
5. Places to take children (museum, aquarium, zoo, amusement park)	3	2	0	1		3	11	0	6
6. Places for children to play (playground, park, field, skating rink)	11	3	2	6		12	17	12	11
7. School	13	1	2	10		15	6	12	19
8. Parent's worksite	6	2	0	4		7	11	0	7
9. Other	23	4	5	14		26	22	29	26

24B. Would you want to live far away from certain things?

0. None/no relevant response	36	8	13	15	.01	40	44	76	28

Table 1 (cont'd.)

1. City/urban density	18	3	0	15	.04	20	33	0	28
2. Crime	10	1	3	6		11	6	18	11
3. Factory/junkyard/dump/ smokestacks/pollution	8	3	0	5		9	17	0	9
4. Traffic/noise	15	2	0	13	.05	17	11	0	24
5. Locations susceptible to flooding, hurricanes, tornadoes, etc.	0	0	0	0		0	0	0	0
6. Dangerous animals, pesty insects	3	1	0	2		3	6	0	4
7. Parents	0	0	0	0		0	0	0	0
8. People they don't like	4	1	0	3		4	6	0	6
9. Other relevant response	22	5	1	16		25	28	6	30

25. Suppose that next week your teacher was going to teach you about homes. If you were going to learn about homes, what would you like to learn?

0. Nothing/no relevant response	5	1	1	3	6	6	6	6
1. Response is relevant but not substantive	0	0	0	0	0	0	0	0
2. One substantive response	24	5	4	15	27	28	24	28

Table 1 (cont'd.)

3. More than one substantive response	60	12	12	36		67	67	71	67

[1]Numbers in the frequencies columns show how many students in each group were coded for mentioning the ideas represented by the response category described at the left side of the table. Underlining indicates that the Chi-square for the underlined distribution was statistically significant. In these instances, the probability values are given.

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